THE IRON TRADE REVIEW

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A New Steel Plant Built at Kokomo, Ind.

Features of the Open-Hearth Plant and Blooming Mill of the Kokomo Steel & Wire Co.—Mono-Rail for Transferring Hot Billets

It constantly is becoming more difficult for small, independent rolling mills to procure adequate supplies of billets, particularly in periods of great business activity. For this reason many companies operating such mills are providing steel-making facilities in order to be independent of fluctuations in the supply and price of semi-finished steel. One of the most recent examples of this tendency toward self-contained plants is found in the works of the Kokomo Steel & Wire Co., Kokomo, Ind., where a new blooming mill and two 75-ton open-hearth furnaces have been added to a rod and wire drawing plant that has been in operation for about 13 years. The problem which confronted the Kokomo Steel & Wire Co. contained a number of unusual features.

FIG. 1—POURING SIDE OF OPEN-HEARTH FURNACES AT THE PLANT OF THE KOKOMO STEEL & WIRE CO.

The only space available for the new installation was a strip of ground 181 feet wide and 1,300 feet long lying east of the rod mill and boiler house. In this area it was necessary to lay out a plant with a rolling capacity of 1,000 tons per day and a steel-making capacity of 300 tons per day, but with sufficient room for enough additional open-hearth furnaces and soaking pits to bring the total steel-making capacity eventually up to 1,000 tons per day. These conditions were met by placing the open-hearth stock yard parallel to the blooming mill and by constructing a mono-rail for delivering the finished product to the rod mill. Incidentally this makes it possible to charge the billets into the rod mill heating furnaces before they have had a chance to cool, thus conserving a large portion of their original heat.

As shown in Fig. 12, the new facilities are housed in a steel frame building 520 feet long and 89 feet wide with the blooming mill located in the south end, the open-hearth furnaces in the north end and the soaking pits in the middle. The open-hearth charging floor is situated in a leanto, 202½ feet long and 65 feet wide, with the stock yard adjoining it on the south, parallel to the blooming mill. The building was fabricated and erected by the Pan-American Bridge Co., Newcastle, Ind.

Only two 75-ton basic open-hearth furnaces have been installed at the present time, together with two 4-hole soaking pits and a 34-inch blooming mill. The furnaces and pits can deliver 300 tons of ingots daily, but the mill has sufficient daily capacity to roll 1,000 tons of ingots into 4 x 4-inch billets. The steelmaking capacity

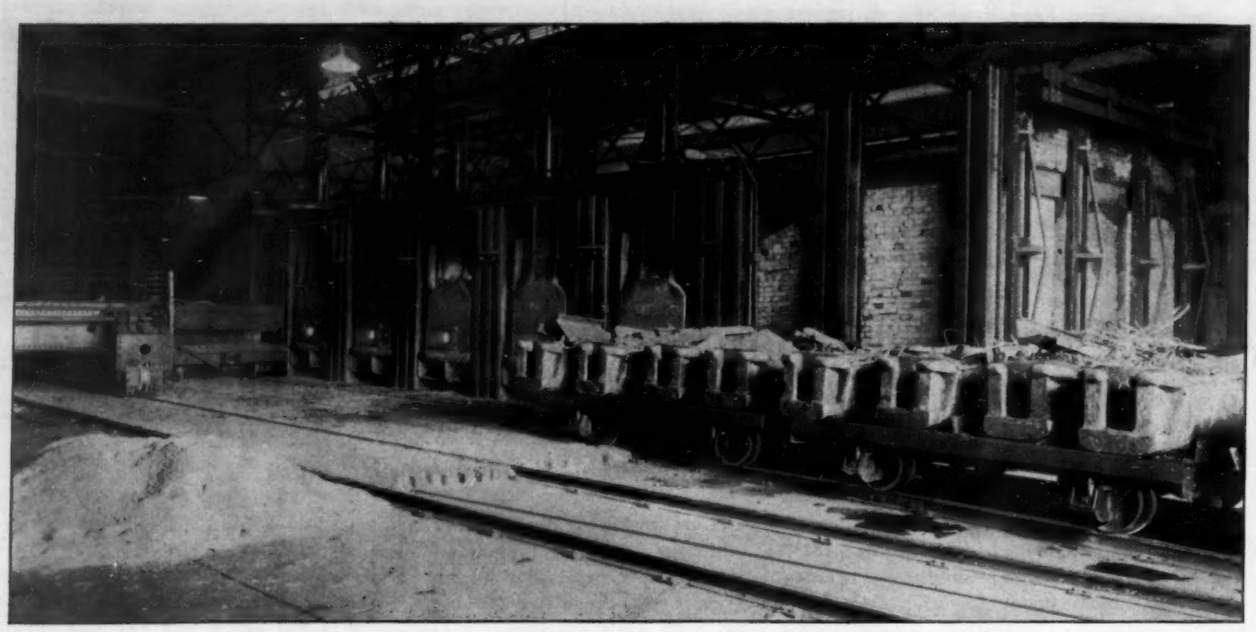


FIG. 2—ONE OF THE 75-TON BASIC OPEN-HEARTH FURNACES

can be brought to a parity with the rolling capacity by building five more 75-ton open-hearth furnaces north of the present installation and adding two more soaking pits which will be placed between the existing furnaces and pits. Sufficient space has been left north of the mill building for this additional construction.

Open-Hearth Stock Yard

The open-hearth stock yard, as shown in Figs. 11 and 12, is 320 feet long and 75 feet wide. It is served by a 10-ton traveling crane furnished by the Alliance Machine Co., Alliance, O., which also furnished all of the other cranes used throughout the plant. The yard crane is equipped with a 54-inch Cutler-Hammer magnet and a standard gage track extends from the charging floor into the yard so that the charging boxes may be loaded by the magnet as indicated in Fig. 11. The difference in elevation between the charging floor and stock yard is about 20 feet, and the yard tracks are laid in the form of a switchback. A steel trestle, 320 feet long, extends from the charging floor to the south end of the yard. The grade on the trestle is 3 per cent. The stock yard has a capacity of 7,500 to 10,000 tons of scrap and pig iron, the crane runway being 30 feet from the ground level. The charging cars were built by the Orenstein-Arthur Koppel Co., Koppel, Pa., and the switching is done by a 40-ton, self-contained, coal-burning Vulcan locomotive. At the south end of the switch-back is a 50-ton Howe scale for weighing up charges. The scale platform is mounted between the knife edges of the weighing mechanism in such a manner that it cannot be tilted by a car resting only on one end.

Charging Equipment

Cast steel charging boxes weighing 1,700 pounds were furnished by the Hubbard Steel Foundry Co., East Chicago, Ind. The boxes are 7 feet long and 2 feet, 4 inches wide inside.

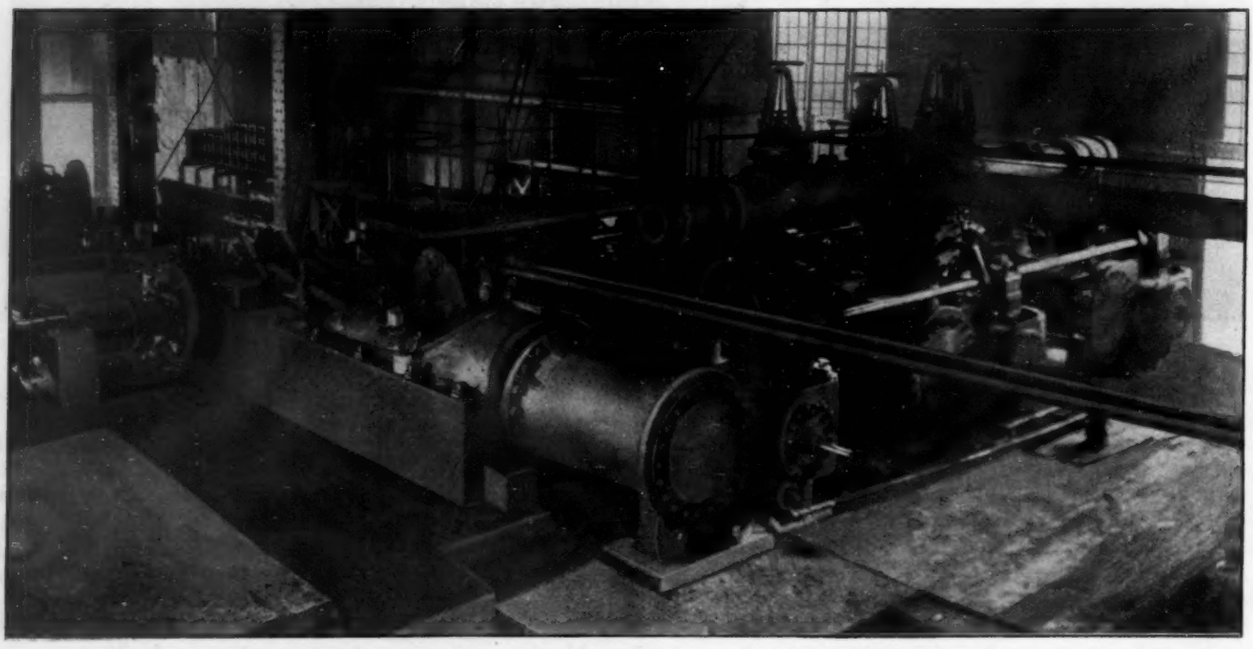


FIG. 3—THE THREE-CYLINDER REVERSING BLOOMING MILL ENGINE

FIG. 4—THE ALLIANCE, LOW-TYPE, 5-TON CHARGING MACHINE

The boxes are charged into the furnaces by a 5-ton Alliance, low type machine operating on a 24½-foot track. It will be noted that this track is wider than is customary in open-hearth practice. The charging machine uses 220-volt direct current. As shown in Figs. 2 and 12, the single track trestle in the yard is connected with a double track on the charging floor. These tracks are laid on 9-foot, 11½-inch centers in front of the furnaces and the inside, or easterly rail of the outside track serves as one of the rails for carrying the charging machine. Therefore, only five rails are laid on the charging floor instead of six, and the construction of one heavy girder under the floor is avoided. The charging floor is of the customary steel plate type, the space between the tracks in front of the furnaces being paved with brick. The platform is 202½ feet long and 40 feet wide.

The basic, gas-fired open-hearth furnaces are each provided with five doors, 3½ feet square, operated by hydraulic jacks which are located vertically over each door. The furnaces were designed and constructed by Alex Laughlin & Co., Pittsburgh, and are 66 feet in length and 20 feet in width overall. The checker chambers, which are situated behind the furnaces beneath the charging floor, have an overall length of 76 feet and a width of 40 feet. The foundations are concrete with four brick piers supporting the hearth. The latter, which are 19 feet, 9 inches long, are 27 inches wide on top and 3 feet wide on the bottom. The framing includes four double-channel and six triple-channel buckstays across the front of the furnace, together with four channels stiffened by truss rods on the ends. The hearth, which is 38 feet in length and 14½ feet in width, rests on a riveted steel pan, which is supported by fifteen 12-inch, 40-ton I-beams.

The gas ports are 13½ inches high and 3 feet, 9 inches wide with an area

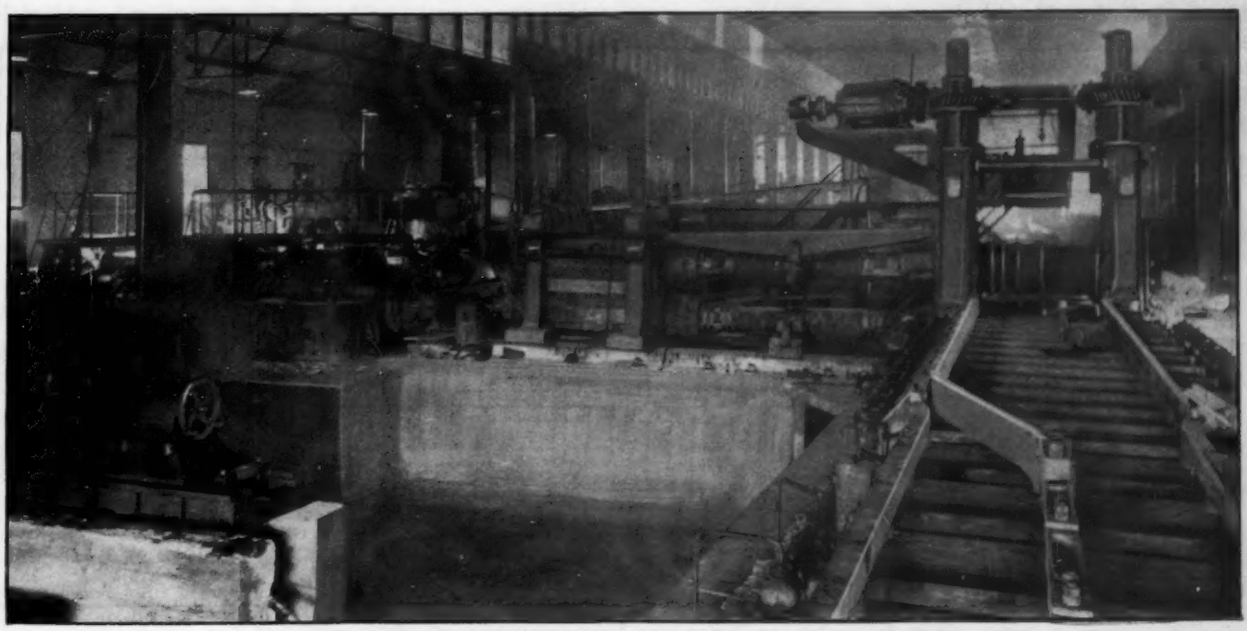


FIG. 5—DELIVERY SIDE OF THE BLOOMING MILL

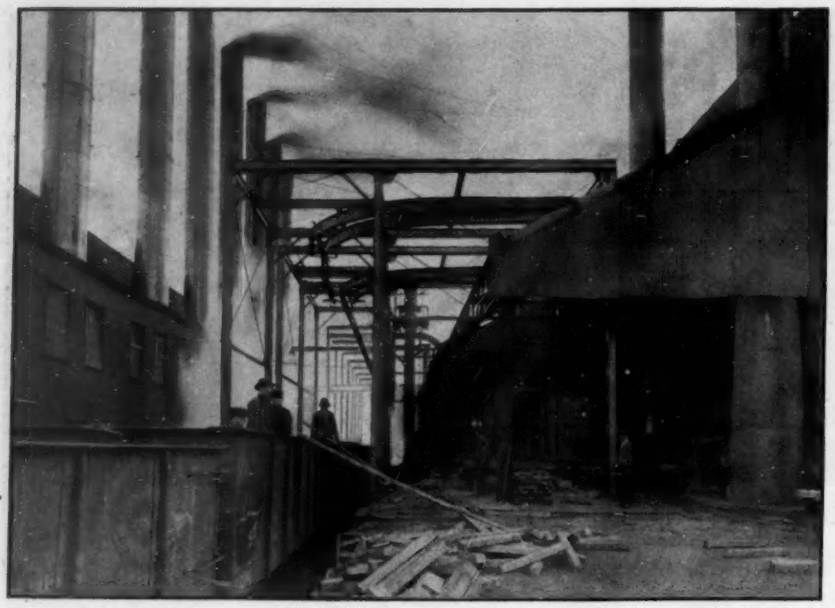


FIG. 6—HOT BILLETS ARE DELIVERED BY THE MONO-RAIL TO THE ROD MILL FURNACES

of approximately 610 square inches. The air ports, which surround the gas ports, extend the full width of the furnace. Their height at the center is 27 inches. The gas regenerators are 18 feet, 3 inches long, 8½ feet wide and 12 feet high; the air regenerators have the same length and height with a width of 12 feet, 3 inches. Standard 9 x 4½ x 2½-inch checker bricks spaced on 9-inch centers are used. Each furnace is equipped with a 48-inch Siemens air valve and a 32-inch Forter gas valve operated by a single hydraulic cylinder situated between the two valves. The links are so adjusted that the valves both reverse at once. This is contrary to the usual practice of first shutting off the gas and then reversing the air. The gas valves were furnished by the Wellman-Seaver-Morgan Co., Cleveland, and the air valves by the Velte Foundry & Machine Co., Pittsburgh. Both gas and air mushroom valves, together with the stack damper, are controlled by wire cables connected to hand wheels situated on the charging platform.

Producer Plant

Gas for furnaces and soaking pits is supplied by a battery of 12 Laughlin, hand-poked producers situated immediately behind the open-hearth charging platform. The producers have an outside diameter of 11 feet, 3 inches and are arranged so that the necessary coal can be supplied by a traveling gantry crane. Four producers are required for the operation of each open-hearth furnace, the remaining four furnishing the gas for the soaking pits. An underground flue leads from the producer house to the pit furnaces. It is 3 feet, 10½ inches by 4 feet, 6 inches in cross-section. The waste gases from each furnace discharge into a steel stack 150 feet high and 6½ feet inside diameter. Both stacks are lined to the top with fire brick.

The first heat charged into No. 1 furnace on Feb. 4 included 80,280 pounds of basic pig iron, 56,000 pounds of heavy melting steel and 6,960 pounds of loose sheet scrap, the total being 143,240 pounds. From this 20 ingots weighing approximately 121,000 pounds were poured and samples of the steel analyzed 0.12 per cent carbon, 0.40 per cent manganese, 0.027 per cent sulphur, and 0.010 per cent phosphor. Eleven hours and 25 minutes were required to bring the heat up to the pouring condition, and it is believed that 10-hour heats will be regularly attained. The gas and air valves are reversed every 15 minutes.

For pouring the heats, three 90-ton ladles have been furnished by John Mohr & Sons, Chicago. The ladles are carried by a 125-ton Alliance four girder crane with a span of 60 feet. The crane is equipped with a 25-ton auxiliary hoist. The general arrangement of the crane, ladle and pouring side of the open hearth furnaces is shown in Fig. 1. The ladles are 9 feet, 2 inches in height, 8½ feet in diameter at the bottom, and 10½ feet at the top. The distance between the lifting hooks is 11 feet 10½ inches; the trunnions were made extra wide so that a 110-ton ladle can be carried in the same bail.

The metal is poured into standard 18

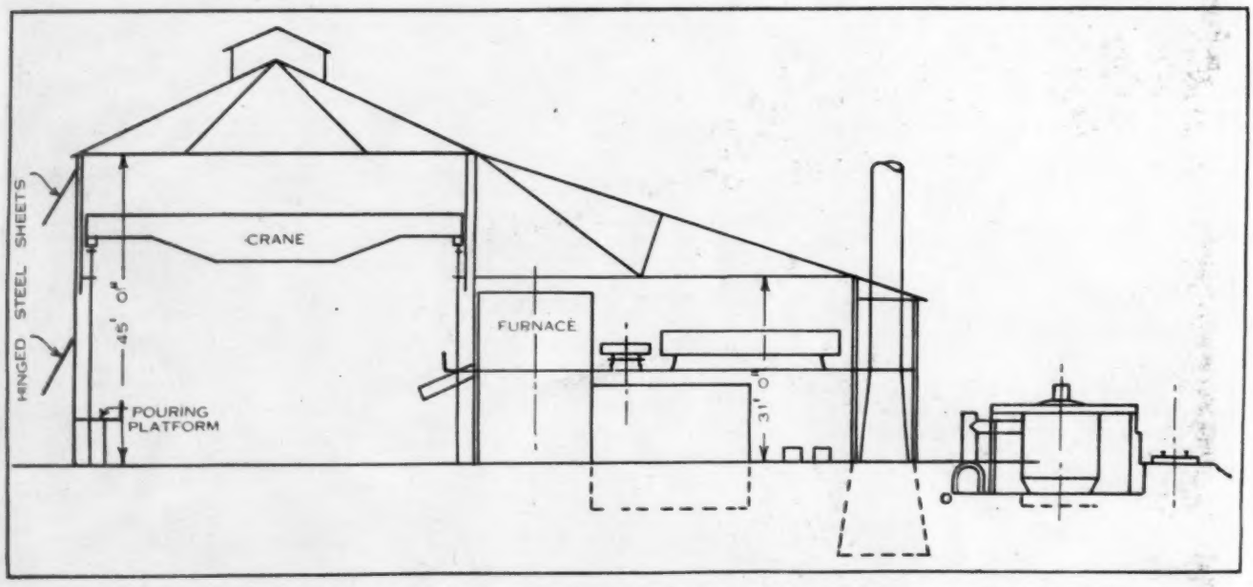


FIG. 7—CROSS SECTION OF PLANT SHOWING THE OPEN-HEARTH FURNACES AND GAS PRODUCERS

x 20-inch ingot molds from a platform 112½ feet long, situated between the furnaces and soaking pits as shown in Fig. 12. The platform is constructed of steel plate with brick paving, and is provided with suitable doors for emergency exits in case of accident. The ingots weigh approximately 3 tons, being 6 feet long, 18 x 20 inches in cross-section at the bottom and 16 x 18 inches at the top. The molds are set on stools situated in front of the pouring platform and the pouring is done by moving the crane from mold to mold. Sufficient space is provided for two rows of 30 molds. One row is sufficient to take care of an ordinary heat, and it is customary to transfer the molds from one line of stools to the other when stripping. An Alliance combination stripping and charging crane with a 60-foot span is provided. The stripping mechanism has a maximum pull of 250 tons and the charging trolley is rated at 5 tons.

The soaking pits, which were constructed by Alex. Laughlin & Co., are standard in every respect and present no unusual features. They are 36 feet square overall, with four holes, each 5½ x 7½ feet in cross-section. Each hole is designed to hold eight ingots. The covers are of standard construction, operated by hydraulic gear and the reversing valves are similar to those on the open-hearth furnaces. Each pit furnace is connected to a self-sustaining steel stack 100 feet high and 4½ feet in diameter.

The charging crane delivers the hot ingots to the approach table of the blooming mill, which extends in front of No. 1 soaking pit, as shown in Fig. 12. This table is 30 feet long and is provided with thirteen 12-inch rollers spaced on 2½-foot centers. The rollers are driven by a 50-horsepower Crocker-Wheeler motor running 600 revolutions per minute.

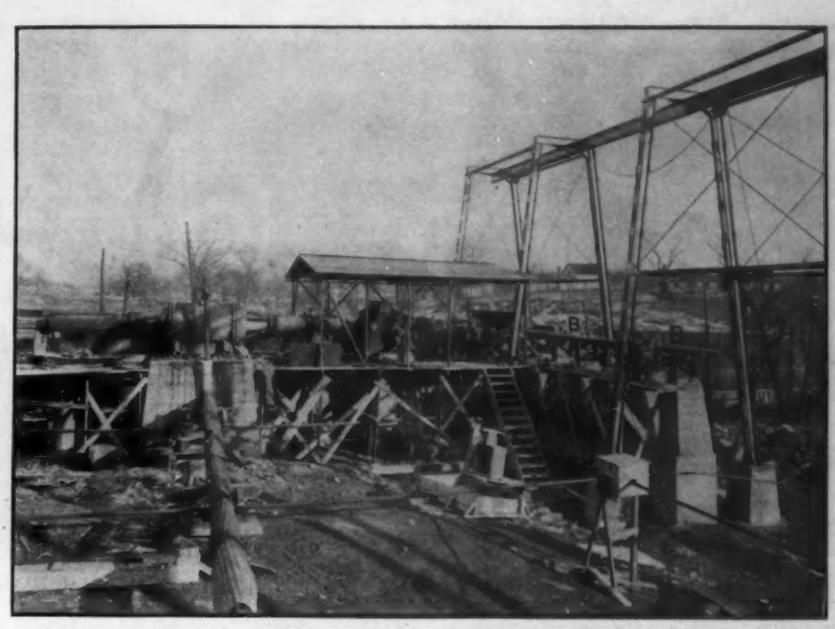


FIG. 8—SHEARED BILLETS ARE PICKED UP FROM THE HOT BED BY THE MONO-RAIL TONGS

The 34-inch, two high, steam driven, reversing blooming mill was designed and built by the United Engineering & Foundry Co., Pittsburgh. Crocker-Wheeler motors are used throughout for the table drives and screw-down, and the engine was built by Mackintosh, Hemphill & Co., Pittsburgh.

The mill is a duplicate of that furnished the Algoma Steel Co., Sault Ste. Marie, Ont. The housing, which is of cast iron box section, is 7 feet in width, the spread of the shoes being also 7 feet. The rolls are 34 inches in diameter by 66 inches in length, with 18½-inch necks, and are connected to the pinions by 16-inch spindles, 12 feet long. The pinions are cast steel with helical teeth. They have a pitch diameter of 34 inches, with 48-inch faces and 7⅛-inch circular pitch. There are 15 teeth in each pinion and the distance between the spindle centers at the pinion housing is 2 feet, 10 inches. The pinions are connected to the engine through a leading spindle 4 feet 8 inches in length. The mill is compactly designed, the distance from the engine coupling to the center line of the runout table being 33 feet 10½ inches. The screw-down motor is rated at 50 horsepower, and is connected to the necks of the upper rolls through a spur and worm gear mechanism. The pinion of the motor shaft is 8 inches in pitch diameter with 24 teeth; it meshes with a gear 22 2/3 inches pitch diameter with 68 teeth, which is on the same shaft with a 9½-inch pitch diameter worm having a 3-inch pitch and a 12-inch lead. The worm is provided with a quadruple thread. The manipulator tables are 31 feet in length, equipped with eleven 16-inch rollers spaced on 2½-foot centers. Hydraulic manipulators with eight fingers are provided.

The Reversing Engine

The engine, which was furnished by Mackintosh, Hemphill & Co., has three cylinders and is so arranged that it may be operated either simple or compound. When running as a simple engine, high pressure steam is admitted to all the cylinders, but when operating compound, high pressure steam enters only the middle

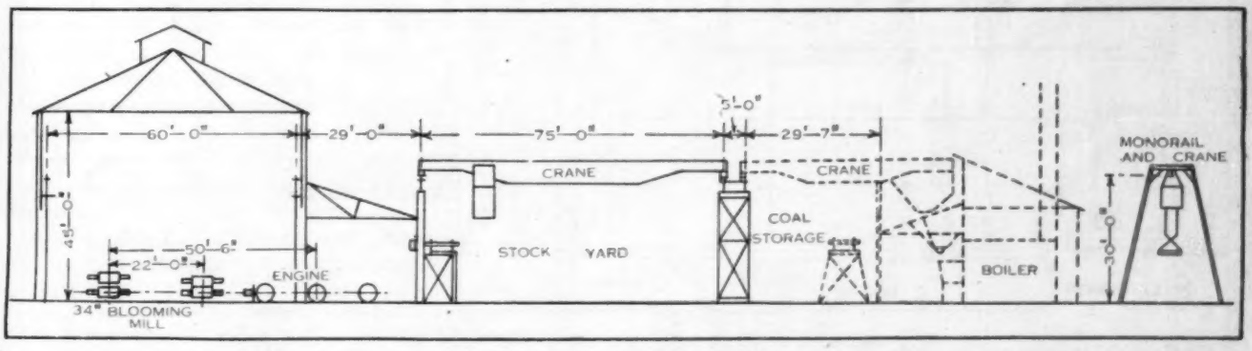


FIG. 9—CROSS-SECTION OF PLANT SHOWING THE BLOOMING MILL AND STOCK YARD

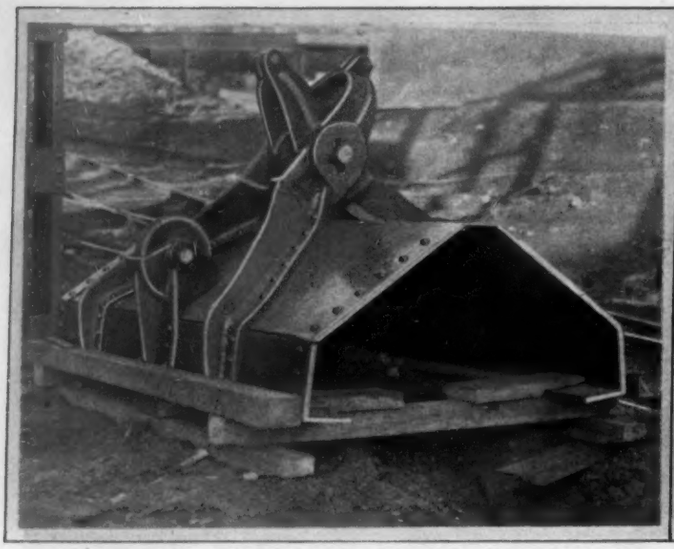


FIG. 10—HOT BILLET TONGS OR GRAB BUCKET

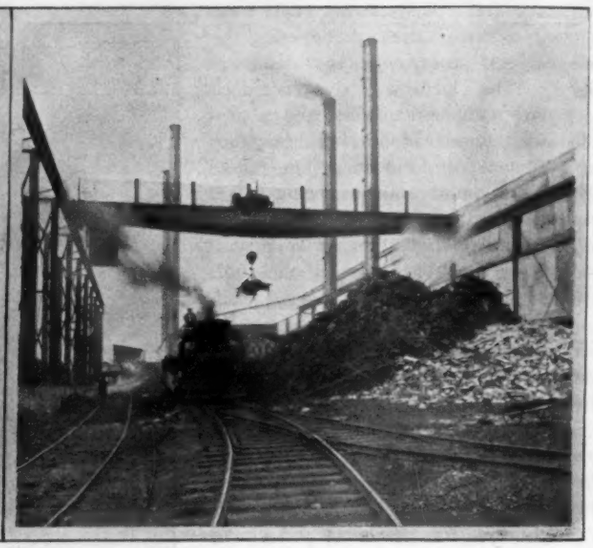


FIG. 11—LOADING CHARGING BOXES WITH A MAGNET

cylinder and expands from it into the two outside cylinders. The engine is of the horizontal type and its general arrangement is clearly shown in Fig. 3. It is said to be the third three-cylinder engine to be installed in an American rolling mill. The cylinders are 36 inches in diameter, with a 42-inch stroke. The engine is provided with piston valves and Stephenson link motion. The crankshafts and crank pins are 20 inches in diameter.

The roller, who stands on a pulpit which spans the approach table of the blooming mill, controls the mill and all of the tables except the runout table leading to the shears outside the building. The latter table is 126½ feet long and consists of twenty-five 12-inch rollers, spaced four feet apart and seven 12-inch rollers spaced two feet apart. The drive is furnished by three 30-horsepower Crocker-Wheeler motors running 600 revolutions per minute. The runout table connects with an 8 x 8-inch duplex billet shear. The latter is followed by an apron table 18 feet long, terminating in a simple hot bed. The overall length of the mill and tables is 249 feet 10½ inches.

Four by four-inch billets will be rolled from 18 x 20-inch, 3-ton ingots in 21 passes. The rolls are provided with a 25-inch open bullhead pass, together with 12-inch, 8-inch, 6-inch and two 4-inch box passes. The ingot will be squared to 12 x 12 inches in the bullhead pass and then reduced to its proper size in the closed passes. The hot shear, Fig. 8, which was furnished by the United Engineering & Foundry Co., is provided with a steam intensifier. Hydraulic power for use in the mill is furnished by a Wilson-Snyder 20 x 7½ x 24-inch pump, together with an accumulator of suitable size.

The hot billets will be sheared to 34-inch lengths and pushed out on

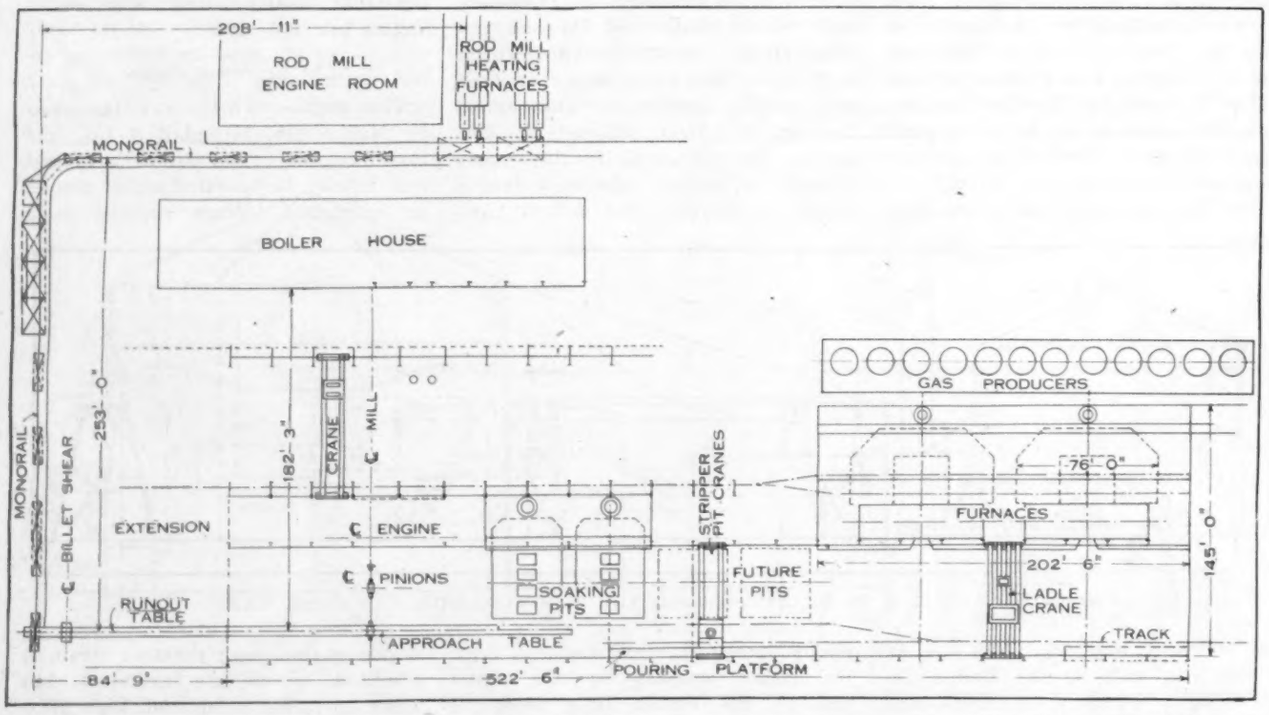


FIG. 12—GENERAL ARRANGEMENT OF OPEN-HEARTH FURNACES, SOAKING PITS, BLOOMING MILL AND MONO-RAIL

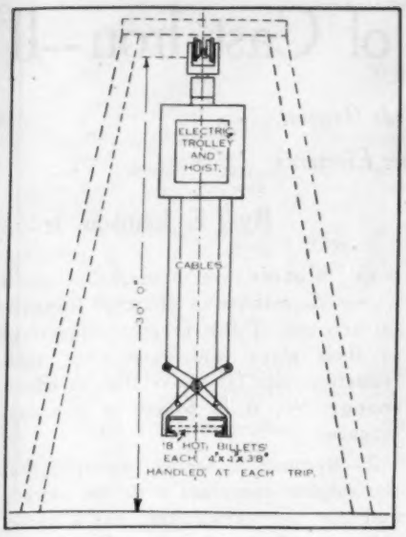


FIG. 13 — CROSS-SECTION OF MONO-RAIL AND BILLET TONGS

the cooling bed, B, Fig. 8. This consists of two rails supported by concrete piers. The mono-rail which is used to transfer the material from the blooming mill to the rod mill is carried over the cooling bed so that the billets may be easily picked up. The mono-rail is 520 feet long, and is designed to transfer 300 tons of hot billets per hour. The trolley is geared so that it makes the round trip in about a minute. The capacity of the mono-rail may be increased by adding additional trolleys or eventually by constructing a second track. The general layout of the mono-rail system is shown in Fig. 12 and a typical cross-section in Fig. 13.

The trolley, which is electrically operated, was furnished by the Johnston & Jennings Co., Cleveland, and a pair of tongs specially designed to pick up hot billets from the cooling bed is suspended from it. The tongs are operated by four wire cables and the details of their construction are clearly shown in Figs. 10 and 13. About eighteen 4 x 4-inch billets can be transferred at one time. The mono-rail delivers the billets onto the receiving table of the rod mill heating furnaces, as shown in Fig. 6, and suitable overhead switches are provided for conveniently handling the material at this point. The tongs are provided with lips which fit over the ends of the billets as they rest on the cooling bed.

Power Plant

Steam for the blooming mill and rod mill is generated in a battery of sixteen 350-horsepower Heine water tube boilers. A feed water purifying and softening plant is furnished by the Dodge Mfg. Co., Mishawauka, Ind. The boiler house is 253 feet 7 inches in length and 50 feet in width, and is situated between the rod mill and the open-hearth stock yard, as shown in Fig. 12.

As previously stated, the finishing departments of the Kokomo Steel & Wire Co. have been in operation for about 13 years. Their equipment includes a Garrett rod mill with two continuous heating furnaces, a wire mill, a nail factory, a barb wire plant, a fence-weaving department and galvanizing facilities. The finishing departments operate on an eight-hour daily schedule.

The officers of the Kokomo Steel & Wire Co. include A. A. Charles, president; J. E. Fredrick, secretary and general manager, and G. W. Charles, treasurer. The improvements described in this article were designed by Lane Johnson, engineer, with the advice and co-operation of J. E. Fredrick.

A New Form of Roofing

The Asbestos Protected Metal Co., Beaver Falls, Pa., now is marketing a new form of prepared roofing known by the name of "Aegisroll". The body or base of this roofing is wool felt impregnated by waterproofiings and completely enveloped in a coating of asphalt compound. To the upper surface of this base is attached pure asbestos felt, while the lower surface is protected by a coating of crushed quartz. Both the asbestos and the crushed quartz are embedded in their respective surfaces while the asphalt is hot and, therefore, are permanently attached. This roofing can be furnished in a variety of attractive colors, making possible artistic combinations between roofs and the color treatment of buildings.

Under the auspices of the National Tube Co., Pittsburgh, motion pictures entitled "From Ore to Finished National Pipe" were displayed at the Y. M. C. A. assembly hall, Cleveland, on the evening of Jan. 24. The meeting was arranged by the Metal Trades Superintendents' and Foremen's Club, although the large attendance by no means was limited to this organization. The pictures, which are unusually clear, show every step of the various operations in the manufacture of pipe from the mining of the ore in the Lake Superior region to the welding of the pipe at the company's plant in the Pittsburgh district.

The National Twist Drill & Tool Co., Detroit, has increased its capital from $200,000 to $300,000.

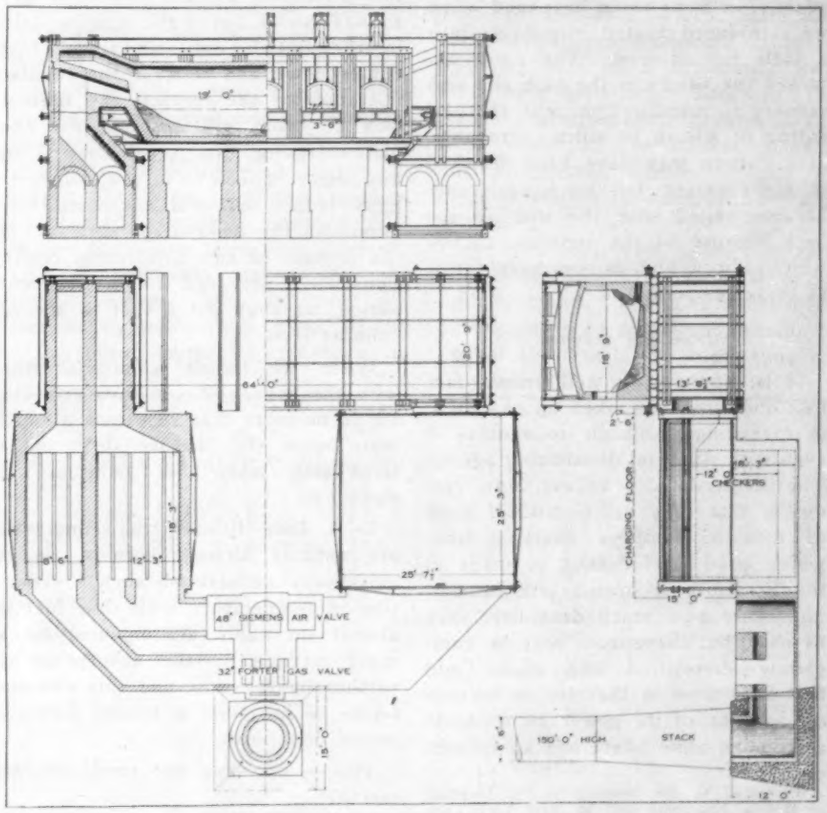


FIG. 14—PLAN AND ELEVATION OF 75-TON OPEN-HEARTH FURNACE

Effect of Oxygen on the Quality of Cast Iron[1]--II

A Discussion of Coke Furnace Conditions as Regards Oxygen, With the Results of Investigations of the Effect of Other Elements

By J E Johnson, Jr.

It seems desirable to point out why it is virtually impossible to get much oxygen into an iron except when the furnace has been in a "mess," and to point out the relation between this fact and the commercial absence of irons of similarly high quality from coke furnaces under the same conditions.

The increase in the affinity of carbon for oxygen is well known to be extremely rapid with increase in temperature. The affinity of silicon for oxygen and the ease with which silicon may be oxidized by oxides of iron is similarly well known. When, therefore, we attempted to introduce oxygen into the iron by disturbing the regularity of the working of the furnace or by blowing in oxide at the tuyeres, we did introduce iron oxide into the bath; but, in the presence of an ample supply of heat and incandescent carbon, this oxide was instantly attacked by either the silicon or the carbon and reduced to metallic iron, which passed into the bath without effect. The same thing happened when we introduced heated iron oxide into a ladle full of iron. The oxide attacked the silicon in the bath and was reduced to metallic iron, with the oxidation of silicon to silica. Probably, also, carbon may have been attacked to some extent, but no oxygen ever became united with the iron of the bath because of the superior affinity which silicon and carbon have for it at these temperatures.

Iron and Oxygen

It is, however, a well known fact that once iron has taken up oxygen it is exceedingly difficult to remove it even with powerful deoxidizing agents. The steelmakers, I believe, now recognize that they get occasional casts of iron of faultless analysis from which good steel cannot be made in the Bessemer or open-hearth furnace, no matter how much deoxidizer may be used, but these irons may be completely deoxidized and made into first-class steel in the electric furnace on account of its power to maintain a reducing atmosphere and an exceedingly high temperature for an indefinite period.

It seems, therefore, that when the temperature of the hearth of the furnace has become lowered by the descent into it of a mass of relatively cold and imperfectly reduced material, this low temperature and the practically complete absence of silicon permit a certain amount of oxidized material to be dissolved in the bath in spite of the presence of more than 3 per cent of carbon. It would seem as though this material were an imperfectly reduced iron sponge, which, either from a deficiency of heat or a deficiency of carbon in the hearth, had never given up its last traces of oxygen, but passed into the bath in this condition. This material, having once become incorporated with the iron, is not deoxidized by any ordinary subsequent reaction.

Spongy Iron

If, now, the furnace be cast while this condition prevails we shall get spongy No. 6, but if the iron be held in the hearth until additional fuel comes down and restores the regular operation of the furnace, the normal iron so made will descend into the bath of spongy No. 6, will liven it up and impart silicon to it, and will, perhaps, reduce, but will not completely eliminate, the oxygen it contains. If the furnace be cast after these conditions have prevailed for a sufficient period, we shall get a cast of special cylinder iron.

When we remelt a normal iron with the spongy No. 6 in a crucible, we do no more than repeat on a small scale what the furnace does on a large scale when the conditions are right.

In a coke furnace the conditions are entirely altered, because, as is universally understood, such a reduction in temperature with that fuel is almost inevitably accompanied by a rapid increase in the absorption of sulphur by the iron, and this element seems to introduce a totally different set of conditions.

This is probably the result of two facts:

1.—That the hearth temperatures in coke furnaces are necessarily much higher than those in charcoal furnaces on account of the greater infusibility of their slags, and even after such reductions are far above that at which spongy No. 6 is found in charcoal furnaces.

2.—Because it seems probable that the sulphur combines with the oxygen and that the oxysulphide has a vastly different effect on the quality of the product from that of oxygen in the absence of sulphur.

I do not wish to be understood as claiming that we have proved that oxygen will unite with sulphur when the latter is present to any considerable extent, and so form an oxysulphide; for I have no direct proof to offer that this takes place. At the same time, the marked difference between the sulphur by the evolution method and that by the gravimetric method in "wild" coke irons, seems to me a strong indication in that direction. Moreover, the wild coke irons seem to follow a different line of development from the wild charcoal irons; for instance, spongy No. 6, which is not infrequently made at charcoal furnaces, is almost unknown at coke furnaces. Those who have made medium sulphur white irons in a coke furnace ("basic") know that this iron when broken shows oxide colors on all the cleavage faces. These are so pronounced and brilliant (ranging from red to purple) as to eliminate the white appearance of such iron completely in some cases, and a very wild coke iron cast into a chill sample pig and cooled off quickly with water will break up into little cubes, of which the faces are every color from purple to black, but practically never white.

Coke and Charcoal

The phenomena are practically never absent in charcoal irons. The temper colors are rarely seen. The wildest of all the iron made, spongy No. 6, shows little or no tendency to break up into cubes, and in general there is but little resemblance between the two varieties of wild iron, whose only important difference, so far as known to me, is the considerable quantity of

[1]Presented at the meeting of the Institute of Mining Engineers held at New York City, Feb. 18.

Table I.
TESTS OF IRON TREATED WITH FERRO-PHOSPHORUS

Original iron. Cast No.	Kind.	Remelt No.	Treated with	Breaking strength. 1.25-in. round bars.	2-in. square bars.	1-in. square bars.	Total carbon, per cent.	Graphitic carbon, per cent.	Combined carbon, per cent.	Silicon, per cent.	Manganese, per cent.	Phosphorus, per cent.	Sulphur, per cent.	Nitrogen, per cent.	Oxygen, per cent.	Fracture.
G	Low 2	.....	.....	3,450	.....	.....	3.77	2.83	0.94	1.17	0.30	0.140	0.020	0.0040	0.048	.....
G	Low 2	R. 277	Straight remelt	.....	20,800	.....	....	....	....	....	....	.....	.....	.....	.....	¼-in. chill, close top and bot., dark col'r, very good fracture.
				3,550	.....	3,500	....	....	....	....	....	.....	.....	.....	.....	
				.....	20,000	.....	....	....	....	....	....	.....	.....	.....	.....	
G	Low 2	.....	Ferro-phos. 5 per cent	.....	21,800	3,500	....	....	....	....	....	.....	.....	.....	.....	Almost white with mottled center, not a cleavage fract.
				.....	.....	.....	3.80	2.81	0.99	....	....	0.680	.....	.....	.....	
				.....	15,900	3,300	....	....	....	....	....	.....	.....	.....	.....	
G	Low 4	R. 263	Straight remelt	.....	10,000	.....	....	....	....	....	....	.....	.....	.....	.....	1.5-in. chill; high-cleavage iron.
				.....	.....	.....	4.28	....	....	1.30	0.58	0.146	0.035	.....	.....	
				....	9,700	.....	....	....	....	....	....	.....	.....	.....	.....	
G	Low 4	R. 262	Ferro-phos. 5 per cent	.....	12,000	.....	....	....	....	....	....	.....	.....	.....	.....	1.5 in. chill; slightly shown cleavage much less marked.
				.....	.....	.....	4.07	....	....	1.25	0.29	0.618	0.031	.....	.....	
				.....	11,900	.....	....	....	....	....	....	.....	.....	.....	.....	

sulphur in the one and the small quantity in the other.

In the course of close observation of coke iron extending over a number of years, I came to the conclusion that the effect of oxygen was to augment the effects of sulphur so that a wild iron with high sulphur was more objectionable; that is, weaker and more prone to break into small pieces by contraction cracks when hard, than an iron with the same sulphur, but not made on a wild-working furnace. This view is not capable of proof by absolute evidence, for unfortunately I cannot offer any such as that with which I have aimed to support my more positive conclusions. At the same time, a conclusion of this kind based on years of careful observation has to my mind a certain value, and I am submitting it for what it may be worth.

High Against Low Carbon

Here it seems worth while to say a word concerning the relative merits of high carbon and low carbon, about which there has been no little dispute, and concerning which but little appears to be known further than that some customers insist on having high carbon irrespective of anything else, whereas, others want the carbon as low as they can get it.

The difference appears to lie in the use to which the iron is put. If it is to be chilled, then the more carbon present the greater the percentage of cementite in the chilled portion and the harder the latter will be, other things being equal. The absence of a sufficient amount of carbon from chilled castings made with a large percentage of steel scrap may well be one of the causes for the poor reputation of such chilled castings as compared with those made with low silicon charcoal irons.

If, on the other hand, a special iron be desired for strength and closeness of grain (but not chill), as in steam or gas engine cylinders, the higher the carbon the worse it makes matters, because the strongest mixture must be one containing approximately 1 per cent of combined carbon, and the greater excess there is over this amount the greater will be the amount of graphite, with its tendency to gather into larger aggregates as its quantity increases, so diminishing both the strength and tightness of the casting.

Effect of Other Elements

During the course of our investigation the effect of various other elements besides oxygen was investigated also, and the results are believed to be worth recording here, though of less importance than those on oxygen.

Analyses for nitrogen by the customary method met with a difficulty which greatly delayed the investigation along this line. We found various quantities of ammonia, which, calculated back to nitrogen, amounted to about 0.01 per cent as a maximum, with quite wide variations. Generally, the highest quantities were present in the irons made on the coldest furnace, but we seemed unable to get any definite relation between nitrogen and quality.

We then made twin remelts of various irons, using the same irons in both crucibles, but adding a considerable quantity of potassium cyanide to one of the crucibles a short time be-

Table II.
TESTS OF IRON TREATED WITH CHROMIUM

Original iron. Cast No.	Kind.	Remelt No.	Treated with	Breaking strength. 1.25-in. round bars.	2-in. square bars.	1-in. square bars.	Total carbon per cent.	Graphitic carbon, per cent.	Combined carbon, per cent.	Silicon, per cent.	Manganese, per cent.	Phosphorus, per cent.	Sulphur, per cent.	Nitrogen, per cent.	Oxygen, per cent.	Fracture.
G	Low 2	.....	.....	3,450	.....	.....	3.77	2.83	0.94	1.17	0.30	0.140	0.020	0.0040	0.048	.....
G	Low 2	R. 277	.....	.....	20,800	.....	....	....	....	....	....	.....	.....	.....	.....	⅛-in. chill, close top and bot., dark col'r, very good fracture.
				3,550	.....	3,500	....	....	....	....	....	.....	.....	.....	.....	
				.....	20,000	.....	....	....	....	....	....	.....	.....	.....	.....	
G	Low 2	R. 281	2.28 per cent Chr.	.....	19,200	.....	....	....	....	....	....	.....	.....	.....	.....	¼-in. chill, slight tendency to cleavage.
				.....	.....	.....	....	....	....	....	....	.....	.....	.....	.....	
				.....	21,100	.....	....	....	....	....	....	.....	.....	.....	.....	
G	Low 2	.....	.....	3,450	.....	.....	3.77	2.83	0.94	1.17	0.30	0.140	0.020	0.0040	0.048	.....
G	.....	.....	4.00 per cent Chr.	.....	21,900	.....	....	....	....	....	....	.....	.....	.....	.....	.....
				.....	.....	.....	....	....	....	....	....	.....	.....	.....	.....	.....
				.....	18,800	.....	....	....	....	....	....	.....	.....	.....	.....	.....

fore pouring. The effect on the chill block cast from these remelts was distinctly marked, increasing the chill and the fineness of the grain and giving a purplish appearance to the zone between the chill and the gray; but the strength of the bars was not materially affected, even by greater quantities of nitrogen than we had ever found in the iron from the furnace, and we reached the conclusion that the effect of nitrogen was not of much industrial importance in cast iron.

Phosphorus

Two twin remelts were made, as above described, using as a base in one case a spotted iron, in the other a special cylinder iron. To one crucible in each remelt was added enough ferro-phosphorus to raise the percentage of this element to about 0.6. The chill was markedly increased in the special cylinder iron, which is more notable in view of the normal high chill of these irons.

The iron was quite low in silicon, so that the chill block was chilled clear through in both cases, but the quality of the phosphorus chill was far better to the eye than that of the straight remelt. There was a marked reduction of the size of the crystals and a tendency to pass from the flat and crystalline to the conchoidal and smooth fracture. The strength was increased about 20 per cent in the poor iron and about 5 per cent in the good iron. The results are shown in Table I.

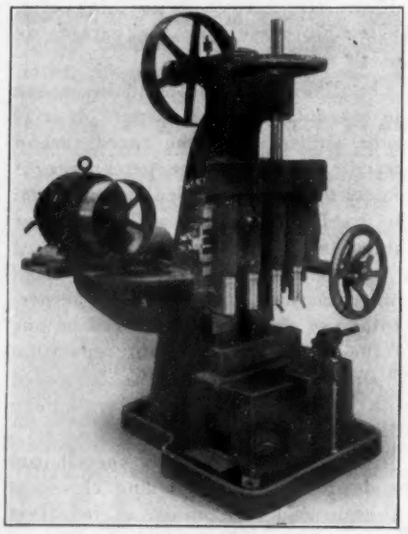
We find here again that remarkable relationship between high chill and strength upon which I have so frequently commented. The obvious explanation is that the iron with a higher combined carbon is the stronger within wide limits, but that this does not tell the whole story in all cases is conclusively proved by other tests.

In the case of phosphorus the ultimate reason for the effect is as little known to us as in the case of oxygen, but we may make a suggestion. The effect of phosphorus in increasing fluidity is so well known as to need no comment here. This presumably means lowering the freezing point of the last-freezing portion; that is, the eutectic, in case the iron has a tendency to form a eutectic. Lowering the freezing point of this constituent would give a better opportunity for the first-freezing austenitic constituent to solidify and knit itself together so as to resist penetration by the plates of eutectic and to force the latter into small, isolated pools of

(*Continued on page* 440*b*)

Newton Rail Drilling Machine

A rail drilling machine of a new design, equipped with a fourth spindle as an auxiliary for drilling the bond hole, now is being manufactured by the Newton Machine Tool Works, Inc., Philadelphia. As shown in the accompanying illustration, the three spindles at the right are employed for the principal drilling operations. The bearing of the second spindle from the right is cast solid with the saddle and the spindles on either side are mounted on individual slides having independent cross adjustment to give center distances of from 3½ to 9 inches. The fourth spindle has a bearing in the common casting with one of the regular drilling spindles and this spindle has a fixed center distance of 6½ inches from the nearest bolt hole. All of the spindles are mounted on a counterweight saddle which has four changes of speed, hand adjustment and power quick return. The spindles are arranged for Morse taper and the work table has adjustable parallel screw stops to suit the various sizes of work. The machine is driven by a Westinghouse 10-horsepower motor operated at 1,300 revolutions per minute and when drilling three 1¼-inch bolt holes and one 1-inch bond hole simultaneously, feeds of 2 inches per minute have been maintained. The bond hole spindle rotates at 25 per cent greater speed than the regular spindles on account of the smaller diameter of the bond hole.



RAIL DRILLING MACHINE BUILT BY THE NEWTON MACHINE TOOL WORKS, INC.

To increase the membership of the Associated Foundry Foremen and as an incentive for work along this line by those affiliated with this society, David McLain, McLain's System, Goldsmith building, Milwaukee, has generously donated a course in his school of foundry practice which will be awarded to the one obtaining the largest number of members between Feb. 1 and Sept. 1, 1914. If a graduate of this school wins the prize, Mr. McLain will award the winner the value of the course in cash. Any foundry foreman is elegible to enter this contest and further details can be obtained from Robert B. Thomson, secretary, Associated Foundry Foremen, 78 Verplanck street, Buffalo.

Welding and Cutting Torches

The Alexander Milburn Co., Baltimore, has distributed to the trade a catalog devoted to its oxy-acetylene welding and cutting torches. The welding torch is designed to produce a neutral and uniform flame that is neither oxidizing nor carbonizing in its action, and to this end the gases are mixed by means of needle valves within the handle, where they are reached by a slight movement of the operator's fingers. The cutting torch is designed for cutting operations only. The gases for the pre-heating flame are governed by needle valves, while the high pressure oxygen for the cutting jet is controlled through the lever on the handle, which operates against a diaphragm valve. The gas pressure on the diaphragm normally holds the line open, leaving the operator's hand free, while pressure of the thumb on the lever cuts off the flow temporarily, when necessary. A slight movement of the locking screw locks the lever in the closed position when it is desired to lay the torch down. Both torches are of light weight, and are durably and substantially constructed. They are furnished in polished and oxidized brass. With the welding torch, six interchangeable tips are provided for different kinds of work. With the cutting torch three interchangeable tips are furnished: One for straight line cutting, having a single preheating jet ahead of the cutting jet; one for two-way cutting, having a preheating jet on each side of the cutting jet and one for free cutting in any direction. In the latter the cutting jet is entirely surrounded by preheating jets.

The catalog includes descriptions and prices of oxy-acetylene equipments which the company manufactures for all kinds of cutting and welding. Attention also is directed to portable acetylene lights for use on railroads, in mines, steel mills, foundries, in contractors' work, etc. The book includes quotations on welding rods and other supplies needed in welding.

The Largest Gas Producer Ever Installed

Plant Built by the Smith Gas Power Co. for Producing Gas From Bituminous Coal—Tar Extractor and Other Features

What is believed to be the largest gas producer ever built, recently was installed at the works of the Illinois Glass Co., Alton, Ill., by the Smith Gas Power Co., Lexington, O. The producer is mechanically-operated, having 240 square feet of grate area. It operates on southern Illinois coal and the gas is used to replace fuel oil in the company's bottle factory. At times the gas has been taken from this producer to operate the 800-horsepower power plant. The producer operates on the suction principle and is equipped with a Smith type tar extractor.

The gas generator is built of a series of transverse sections, in this case five having been installed. The two-end sections are semi-circular for structural reasons. The three middle sections are identical in construction and a producer unit of any size and capacity may be built by adding the required number of middle sections.

A horizontal cross-section through the fuel bed is rectangular in form. The fuel is supported on a flat, rocking grate with stoking grates rising at an angle of 45 degrees on either side. The grates in each side of each section are independent of those in every other section, and the stoking grates may be operated continuously or at intervals, as conditions require. They serve to feed the fuel from the magazine down into the active part of the fire. The flat rocking grates cut the ash from the center of the fire and are operated by an air cylinder at the will of the attendant.

Each section has its own independent blast and fuel supply and thus acts in many respects as a single producer. The quantity of blast for each section may be regulated by the operator so as to insure most uniform and consistent operating conditions.

A central water-cooled gas outlet is suspended from the head of the machine in the manner characteristic of all Smith producers. Two bell-type charging hoppers are provided in each section, one being located on either side of the central gas outlet. The producer is charged with coal clear to the head and the space above the lower end of the gas outlet and below the head acts as a fuel magazine from which the coal gradually settles into the active fuel bed assisted by the action of the stoking grates.

This peculiar construction gives large grate area in small space and makes it possible to build single units of any desired capacity. It also increases producer efficiency by reducing the wall area and radiation per unit of capacity. The constant agitation of the fuel bed insures uniform gas quality. The central gas outlet which is placed low down in the fuel bed compels the blast to pass through the fuel instead of passing up along the lining and escaping from the producer without coming in actual contact with the coal. It also compels the volatile parts of the fuel, which gradually distill off in the magazine, to pass through a part of the hot and active fire where they are converted

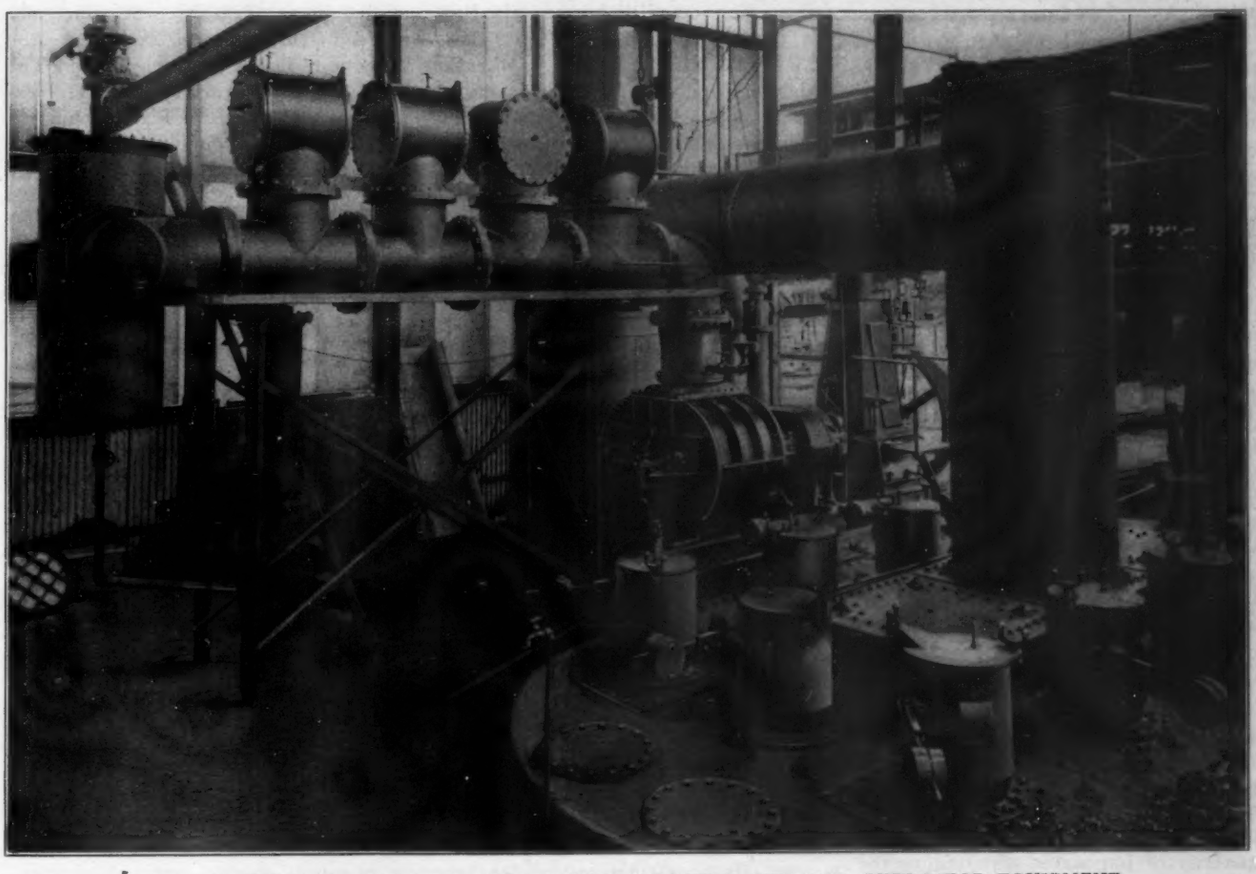


FIG. 1—OPERATING FLOOR OF GAS PRODUCER SHOWING THE TAR EXTRACTOR EQUIPMENT

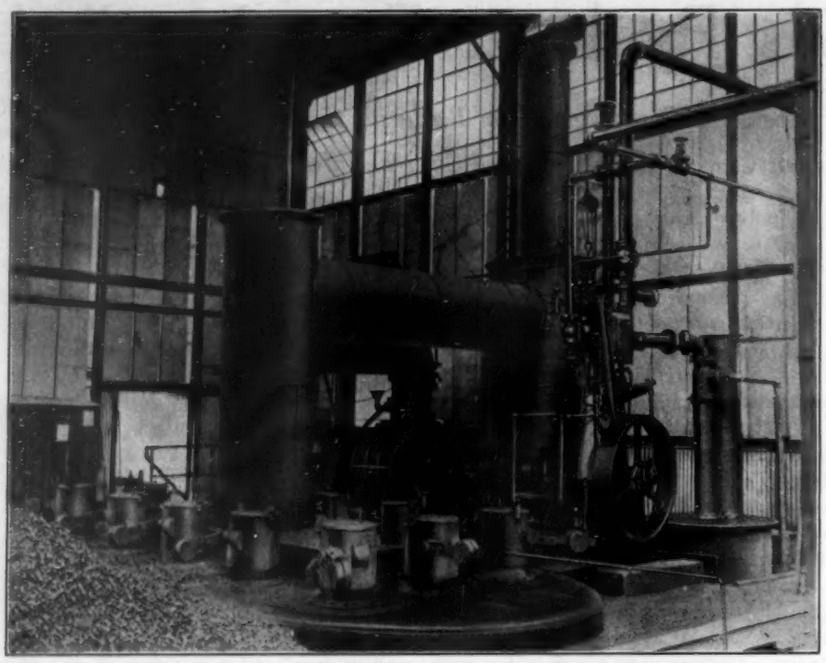


FIG. 2—CHARGING FLOOR OF THE FIVE-SECTION PRODUCER

into fixed gas. For this reason the tar carried over in the gas contains less than 5 per cent of the volatile of the coal and it will be shown later how this can be returned to the fire and gasified, thus converting the entire combustible of the coal into fuel gas, leaving ash as the only by-product.

Other features of the plant are characteristic of smaller types of Smith producers for bituminous fuel but are sufficiently novel and differ so widely from current practice as to be worthy of careful consideration.

In the first place, it may be noted that steam is not used in the blast. There are several good reasons for this, the chief of which is the fact that it is not possible to control the ratio of steam to air in a manner sufficiently accurate to insure uniform operating conditions. In this plant the moisture for the blast is carried along with the air in the form of vapor, the air being heated and saturated by contact with hot water. The saturation of the blast takes place in a steel tower filled with wooden grids over which hot water flows. By controlling the temperature at which the air leaves the saturator the ratio of vapor to air is definitely known at all times. In other words, the saturator is an air conditioning apparatus where the air becomes slightly super-heated and saturated for its temperature. The degree of saturation is taken care of automatically by a thermostat which controls the quantity of hot water admitted to the saturator. The water required is heated by the waste heat from the plant.

Another feature of the plant is the gas cleaning equipment. This consists, first, of a primary condenser, or cooler, in which the gas is partly cooled by water sprays. Beyond the primary condenser is a steam engine-driven Connersville, horizontal, Boston type gas pump. The gas pump draws the gas from the condenser and, therefore, all of the apparatus up to that point, including the saturator, producer and condenser, operate under slight vacuum. It makes continuous operation possible. The ash-pits may be opened at any time and the fire cleaned, the grates inspected and ash removed without affecting operating conditions. Since the producer is under vacuum, noxious gases cannot escape into the room when charging or barring the fire and hence the labor troubles incident to the operation of pressure producers are not experienced.

The Tar Extractors

The gas is delivered by the pump under the necessary pressure to the tar extractor and gas main. The extractor is perhaps the most unusual feature of the whole plant and marks a great advance in gas engineering. This tar extractor has no moving parts, uses no water, requires a small amount of power and insures effective cleaning. The cleaning effect is secured by forcing the raw gas under high velocity through a porous diaphragm of glass wool. This diaphragm does not act as a filter because both tar and gas pass through it. The tar enters with the gas in the form of tar fog, and during its passage is agglomerated into large drops which fall out of the gas current by gravity and drain into a trap or sump, located in the gas main.

In this plant four extractors are installed in parallel, three of which are of sufficient capacity to clean the maximum output of the producer. The fourth is always in reserve. The extractors are shown in Fig. 1, which illustrates the charging platform of the plant. These extractors are the T-

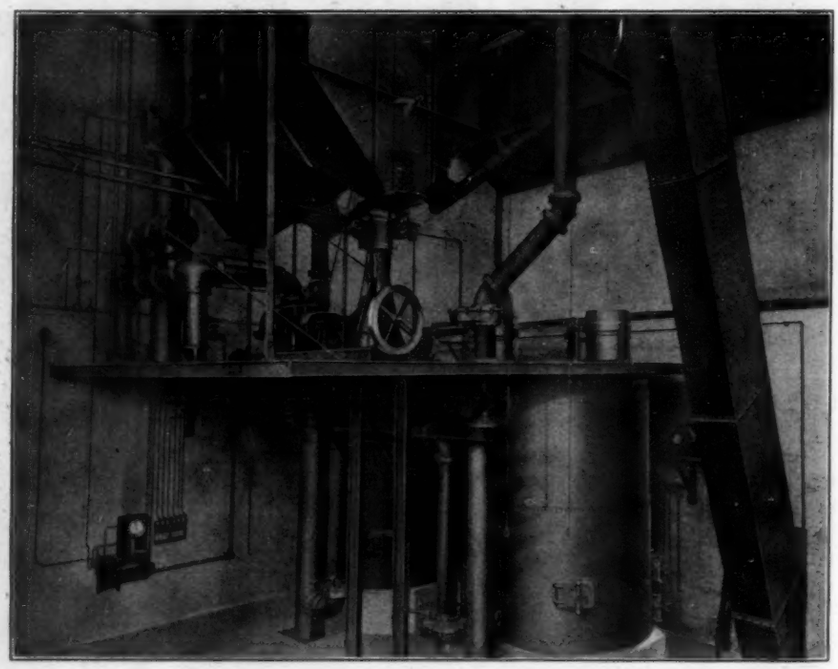


FIG. 3—TWO SMITH PRODUCERS WHICH FURNISH CLEAN, HIGH PRESSURE GAS FOR HEAT-TREATING AND FORGING

shaped housings mounted on the gas main. The one turned at right angles to the gas main is cut out of service. The extractors are designed to be cut in or out of service for inspection or repairs without affecting the operation of the plant.

Unlike most fuel plants where clean gas is required, no gas holder is necessary. The gas is delivered to the distributing system under one pound pressure. The pressure is controlled by the speed of the steam engine-driven gas pump. A diaphragm regulator operating on the engine governor controls the pressure automatically. In this way gas is made only in such quantities as the demand of the moment requires.

The exhaust steam from the engine is used to heat the water for the saturator. In this way the steam ordinarily required for blowing a pressure producer, in this case, not only furnishes vapor for the blast, but also power for cleaning the gas and placing it under pressure.

The Tar

The tar which collects in the trap beyond the tar extractor amounts to six or eight gallons per ton of coal burned. It is exceedingly free from moisture and contains from 15,000 to 16,000 British thermal units per pound. It may be used in the same manner as fuel oil for heating purposes. In some Smith plants arrangements are made for returning the tar to the producer automatically as it is made and converting it into fixed gas. The tar is turned in such a manner as to utilize the sensible heat of the gas leaving the fire in the destruction process. In this way producer efficiency is greatly increased because all of the volatile is converted into fixed gas and the amount of heat in the cooling water is greatly reduced.

This plant was installed to replace 3-cent fuel oil. It operates on southern Illinois coal costing $2.25 per ton. No ash or coal-handling apparatus is provided so that coal and ash must be handled manually. Under these conditions the saving over 3-cent oil is approximately 25 per cent on the investment. Included in the cost of operation were fuel, labor and all fixed charges.

The producer capacity, which is limited in this case by the capacity of the exhauster, is about 36 tons of coal per 24 hours. The plant is in continuous, 24-hour service. The gas is very uniform in quality and averages about 155 British thermal units per cubic foot. A continuous record of the gas quality is kept by a Smith recording gas calorimeter.

With gas of this quality it is possible to reach any temperatures secured with fuel oil when used in furnaces of proper design. Since the gas is clean, cold and under high pressure it may be distributed over a large area through relatively small pipes in the same manner as illuminating or natural gas. The gas is, therefore, well adapted to use in small furnaces for annealing, forging, heat-treating, melting and all similar operations.

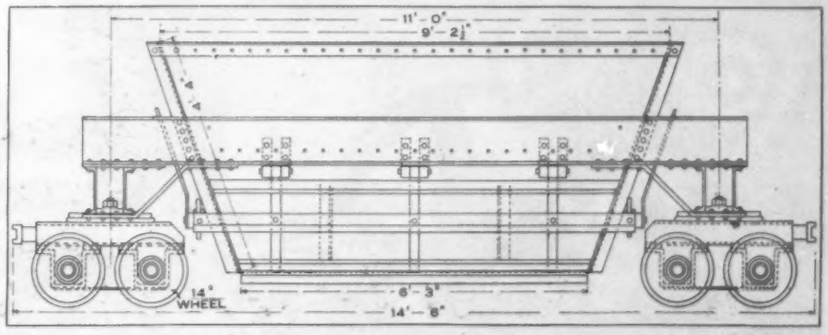
Stockpile Car of Large Capacity

A double truck stockpile car of exceptionally large capacity is being used at the Cuyuna range mines of the Rogers-Brown Ore Co. It also differs from many similar cars in the large amount of steel used in its construction. The car has a capacity of 100 cubic feet, or 6½ gross tons, assuming the weight of the ore to be 145 pounds per cubic foot. The four-wheel cars formerly used carried only 45 cubic feet, or 3 gross tons.

The overall length of the new car from draw bar to draw bar is 14½ feet; the extreme width is 4 feet 4 inches, and the height of the body from the top of rail is 4 feet 7½ inches. The truck center pins are 11 feet apart; the body is 4 feet wide inside; 9 feet 2½ inches long on top, and 6 feet 3 inches on the bottom. The body is swung between the trucks to insure a low center of gravity and to permit the use of side doors for discharging the load.

The trucks run on a 24-inch gage track and the four wheels are each 14 inches in diameter, cast from manganese steel. The journals are placed between the wheels, which are forced on the axles and the load is carried on Hyatt roller bearings. Rolled steel sections are used for the framing of the trucks and the draw bars are attached to heavy steel springs. The center line through the draft gear is 14½ inches above the top of rail. The body is carried by two 10-inch 20-pound channels which are supported on the ends by 10-inch, 15-pound channels riveted to the truck frames. By cutting a few rivets the body may be removed from the car intact. The body is framed with 2½ x 2½ x ⅜-inch, 3 x 4 x 7/16-inch and 3 x 3 x ⅜-inch angles. The latter form the top stringers and the others are a part of the door framing. A 2-inch wood lining is bolted to the framing. The gable bottom of the car is carried on A-frames fabricated from light angles and ⅜-inch plate.

The doors are 7 feet, 11 inches in length at the top and 23 inches wide. They are carried by three hinges riveted to the heavy channels that carry the body, and are designed to open wide and prevent the ore from sticking. The doors are controlled by a self-locking linkwork operated by a lever placed at each end of the car. The doors will open quickly.



A DOUBLE TRUCK STOCKPILE CAR

The double truck is expected to add to the life of the car and to permit higher speeds; dangers from derailment, always present with a single truck car, are avoided. The cars were designed by the Rogers-Brown Ore Co. under the direction of H. J. Kruse, superintendent, and are being built in the company's own shops. Similar cars with a capacity of 80 instead of 100 cubic feet will be installed underground on the main haulage levels of the company's mines. The large underground cars, which will be electrically-operated, are expected to materially reduce the tramming cost.

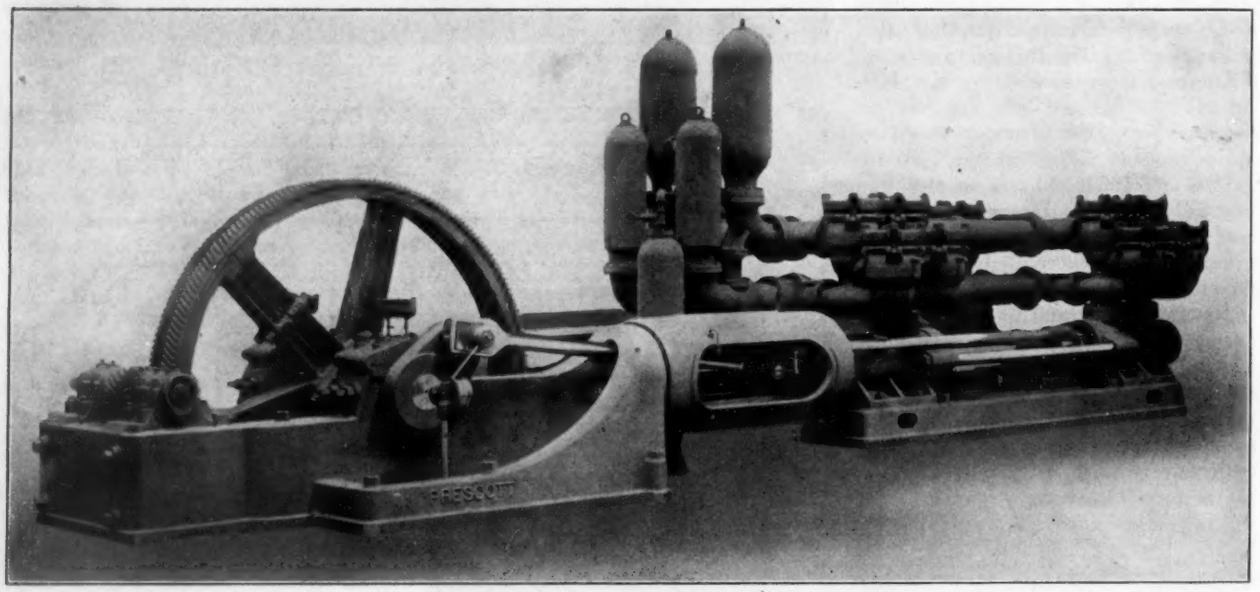
S. R. Vanderbeck, 217 Walnut street, Philadelphia, has been appointed representative in that territory of the Whiting Foundry Equipment Co., Harvey, Ill. He also represents in that district the Atlas Car & Mfg. Co., Cleveland; Orton & Steinbrenner, Chicago, and the New Jersey Foundry & Machine Co.

High Efficiency Pump Installation

The Fred M. Prescott Steam Pump Co., Milwaukee, recently made a notable installation of horizontal duplex power pumps at a mine in Mexico. Three pumps have been installed in the underground station, the plunger diameters of each being 4⅝ inches, 36-inch stroke, with a capacity of 500 gallons per minute against a 1,500-foot head at 47 revolutions per minute. The pumps handle mine water and the installation was made with a view of adding a fourth unit if the water increases beyond that which can be safely handled by two machines, the third being used as a spare. The electric motors driving the pumps are of the alternating current induction type, three-phase, 50-cycle and operate at 500 revolutions per minute.

One of these pumps is shown in the accompanying illustration and it will be noted that special attention in its design was directed to the water end. The variation in the water flow made it desirable that some means be provided for changing the capacity and this is accomplished in this design by changing the diameters of the plungers, made possible by the use of a hollow steel crosshead which permits the plungers to be removed and others substituted without dismantling or moving any of the permanent parts of the pump. By having the stuffing boxes centrally located instead of at the ends, the dripping of water on the main slides is eliminated. The water valves are of the double port type, faced with steel and the valve pots are fitted with hinged covers to provide for quick inspection and repair. The water ends are furnished with both suction and discharge air chambers of ample capacity, as well as an air charging device operated in connection with the compressed air supply in the mine, together with the pressure from the discharge column.

The power end is of the heavy tandem type, the same as is employed in connection with the Corliss flywheel pumping engines, built by the Prescott company, and the proportions are ample for any strain incident to mine work. The main bearings are of the quarter box type, and all pins, rods, cranks and shaft are of heavy design. The gears are of the cast steel herringbone type, made in halves and bolted, the pinions being cut from solid blanks. The couplings joining the motor and pinion shafts are of a special design, provided with leather links to take up any slight inaccuracies of alignment and operation. A mechanical efficiency of 85 per cent was guaranteed on these pumps, which has been exceeded in practice.



HORIZONTAL DUPLEX POWER PUMP BUILT BY THE FRED M. PRESCOTT STEAM PUMP CO.

Heating and Ventilation

A revised edition of "Heating and Ventilation" has been issued by the B. F. Sturtevant Co., Hdye Park, Mass. More than 25 years ago the first edition of the book known as "Ventilation and Heating" was published by the Sturtevant company, and, owing to the heavy demand for this work by architects, engineers and students, it was found necessary to issue numerous editions.

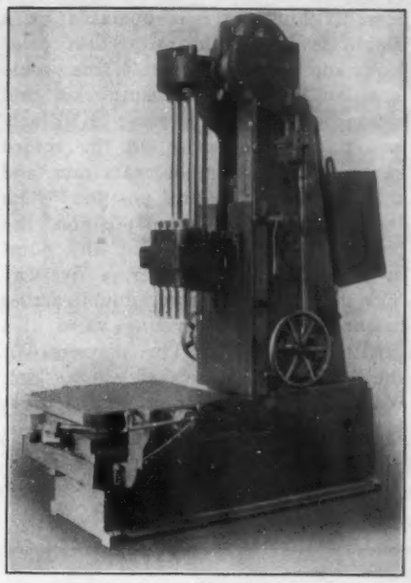
In arranging the present edition an effort was made to make it more generally useful as a book of reference by a careful and logical arrangement of its contents and by a thoroughly complete index. Part 1 constitutes the text matter, which is divided into 10 chapters, and this is further subdivided into sections. The first chapter considers air, its composition, properties and physical characteristics, and the second chapter deals with the subject of ventilation, its necessity, the way it is measured and the method of supplying mechanical ventilation. Succeeding chapters deal with heat, heating and various artificial methods of heating buildings, the hot blast system of combined heating and ventilation, a general study of the apparatus used in heating and ventilating installations, problems involved in calculating heating and ventilation systems, testing systems, individual problems involved in the ventilation and heating of distinctive types of buildings and rooms. Chapters 9 and 10 contain descriptions of typical installations of Sturtevant apparatus and system. Part 2 consists of a collection of tables for the use of students and engineers covering the subject of ventilation and heating in general and Sturtevant apparatus in particular. The work contains 323 pages and is well printed and illustrated. Owing to its heavy cost of production, a nominal charge is made by the Sturtevant company to those desiring this work.

The Production Engineering Co., 1716 Spring Garden street, Philadelphia, has received an order for the erection of a foundry building, 90 x 126 feet, to be erected for the De La Vergne Co. at 138th street and Locust avenue, New York City. Plans may be obtained from the Production Engineering Co.

A Serpentine Shear

The serpentine shear shown in the accompanying illustration is a new type of machine now being offered to the trade by Joseph T. Ryerson & Son, Chicago, which is designed particularly for the straight and irregular cutting of sheets and plates. The frame is a steel casting of spiral construction, designed to provide sufficient clearance for material of unlimited length or width. The shear can be employed not only for straight cutting, but also for cutting in or out-curves having a minimum radius only slightly larger than the diameter of the blades. The spiral steel frame carries all gearing and is mounted on a substantial cast iron base. The blades, made of high grade tool steel, are set approximately in a horizontal plane, which affords a larger cutter bearing on the sheet or plate and consequently there is little distortion of the material being cut. The upper cutter is positively-driven, while the lower cutter is mounted in an adjustable sleeve so that its position may be varied to allow for different thicknesses of material and for redressing. In addition to this, a cam is provided so that the lower blade can be dropped sufficiently to permit the removal of sheets without reversing the machine. The cutters have a flush fast-

SERPENTINE SHEAR ADAPTED FOR THE STRAIGHT AND IRREGULAR CUTTING OF SHEETS AND PLATES



VERTICAL SPINDLE, CYLINDER BORING MACHINE

ening to the shaft, so that no nut projects to interfere with the handling of the work and the knurled edges feed the sheet automatically into the machine. A tool steel pin is provided for taking up the end thrust on the lower cutter shaft.

When cutting a number of sheets to the same pattern, a template may be bolted to the work, which can be followed by guiding against the top cutter. All gears are cut from the solid and are provided with cast iron guards.

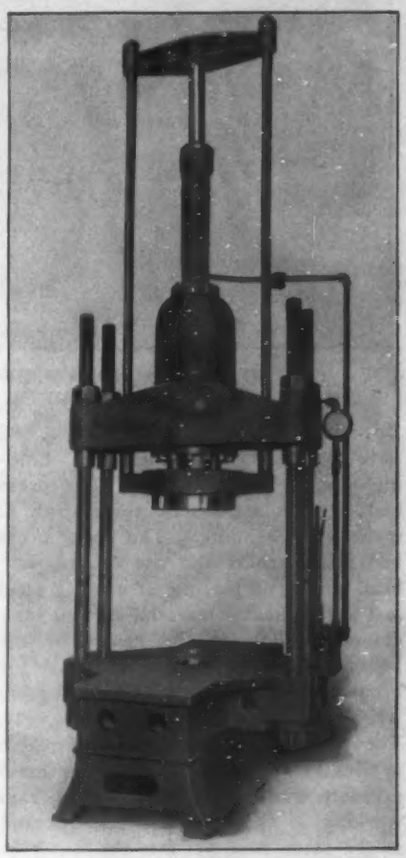
The machine is driven by a two-speed pulley giving slow speed for intricate curve cutting and high speed for straight work. The main shaft is extended and squared on one end so that a hand crank may be used if power is not available. The shear illustrated has a capacity for cutting No. 10 gage material and lighter, although other sizes having capacities of No. 16 gage, ¼ inch and ⅜ inch material can be furnished. All machines are arranged for either belt and hand power or direct motor drive.

A Vertical Spindle, Cylinder Boring Machine

The Beaman & Smith Co., Providence, R. I., is now building a vertical spindle cylinder boring machine. As shown in the accompanying illustration, it is provided with four spindles, or can be furnished either with three or six spindles, as desired. The spindles have a common head attached to a counterbalanced saddle having a vertical movement of 29½ inches. The revolving work table is 36 inches square and has two index points. The work, which is held in suitable fixtures, can be changed while the boring operation is being performed. The table, being supported on a ball bearing, is easily revolved and lowered. The machine is operated by a seven-horsepower motor, the power being transmitted to the spindles through spiral and spur gears.

A 250-Ton Straightening Press

A 250-ton hydraulic press, originally designed for straightening structural steel bars and shafts, but which can be used for a wide range of work in machine shop service, being particularly suitable for bending, forming, broaching, etc., now is being built by the Hydraulic Press Mfg. Co., Mt. Gilead, O. The stock space of this machine has a variation of 28 inches, with a minimum of 20 inches and a maximum of 48 inches. As shown in the accompanying illustration, it will be noted that the strain rods are threaded on the upper ends to one-third of their length and are provided with nuts adjusted to both upper and lower sides of the cylinder bearings. When the stock space is to be in-



A 250-TON HYDRAULIC PRESS FOR STRAIGHTENING STRUCTURAL STEEL AND BARS

creased a block is placed between the ram and pressure bed. The upper nuts then are set to the desired point and the pressure is applied. This action raises the cylinder to these nuts. When the work is of such a character that it requires a smaller working space, the block is still kept in position between the ram and the pressure bed, but the lower nuts are adjusted to the point desired while the pressure is still applied and the pressure then is released, which relieves the strain on the upper nuts. This action lowers the cylinder to the point desired and the upper nuts then are readjusted.

To permit the raising and lowering of the cylinder, the pipe connections are provided with swing joints.

leased. This valve is operated by a single lever, which in its first position admits and controls the pressure on the main pressure ram and release on the return ram; in its second position, pressure on the return ram and release on the main ram, and the third is the neutral position which holds in a stationary position the pressure with the rams at any point in their travel. However, a five-way high and low pressure, double-acting balanced poppet operating valve also can be furnished. The diameter of the head and the travel of the ram is 20 inches. The length of the press bed overall is 72 inches, while the width of the working space is 26 inches. Steel is used throughout the construction of this machine.

tor. Exclusive of the motor train, the machine is triple-trained, including the intermediate and driving train of gears. A rawhide motor pinion meshes into a cut steel gear on the driving shaft. The mill is equipped with hardened and ground, mirror-lapped steel rolls and the housings are provided with hand wheels with micrometer adjustment. The wabblers, wabbler couplings and herring-bone gears are covered with a hood. The back gear ratio is 16 to 1 and the weight of the mill is 3,600 pounds.

The modification of the mill shown in Fig. 1, adapted for belt drive, is illustrated in Fig. 2. The bed is a single casting and is of a different type than the bed of the machine, Fig. 1, which is provided with separate

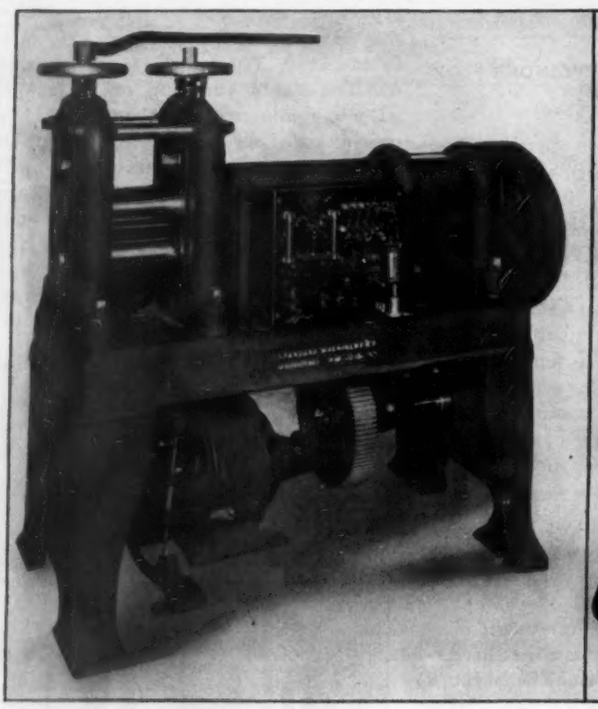


FIG. 1—MOTOR-DRIVEN ROLLING MILL FOR LIGHT WORK

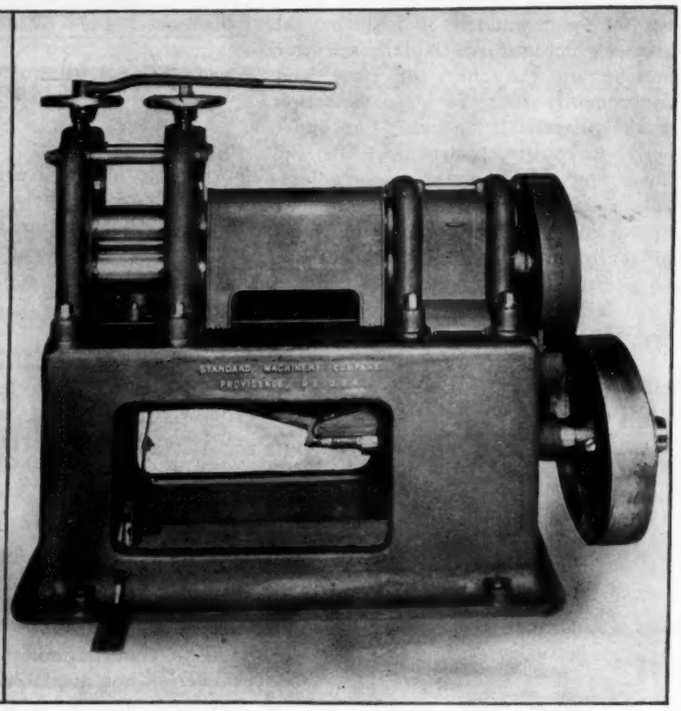


FIG. 2—BELT-DRIVEN ROLLING MILL FOR LIGHT WORK

Both the ram head and the press bed have tee slots for attaching bending blocks, forms or dies. The press bed permits maximum centers of 72 inches for bending. The long press bed also permits the use of an overhead crane in placing structural steel and other heavy material on the machine. A hole in the center of the bed permits the press to be used for broaching work and for forcing wheels on and off shafts, axles, etc. The four-way poppet operating valve applies the pressure either to the main pressure ram or to the return ram working in the pullback cylinder and at the same time permits the water or oil used in operating the press to return to the pump reservoir from the cylinder on which the pressure is re-

Rolling Mills for Light Work

Two new types of rolling mills for light work are now being built by the Standard Machinery Co., Providence, R. I. The mill shown in Fig. 1 is equipped with rolls 5 inches in diameter and 8-inch face. It is driven by a constant speed motor and is provided with a special Cutler-Hammer controller for the purpose of permitting the mill to be started and stopped by foot control. Underneath the bed of the mill is located an oil switch, which is connected to the automatic switch and permits the operator to press down and lock the treadle. When through rolling, the treadle is moved by the foot, allowing it to snap back by a spring, thereby stopping the motor.

legs. The clutch is of the cone type, operating over a hollow shaft, and this construction permits the mill to be started and stopped without the use of the hands. The clutch is thrown in and out by a spiral spring on the end of the shaft.

The United Gas Improvement Co., Philadelphia, issued last month the first copy of a new house organ called "Kitchen Efficiency", which will describe the various uses of gas for cooking foods.

A six-page folder issued by the Smooth-on Mfg. Co., Jersey City, N. J., illustrates the applications of iron cement for waterproofing and stopping leaks in concrete.

IRON AND STEEL MARKETS

Pig Iron Makers Take Stand for Higher Prices

Following Investigation as to Orders on Hand and Costs—Old Material Market Slumps—More Activity in Railway Rolling Stock

BY GEORGE SMART.

Unusual frankness and co-operation on the part of many pig iron producers in the central west have resulted in the conviction that higher prices on pig iron are justified and demanded by present conditions. It has been found that the order books of the furnaces carry very large tonnages, that stocks in furnace yards are low and that a large part of the tonnage has been sold at less than cost. Hence the determination of furnace men to take a stand for reasonable prices. This upward tendency is not, however, confined to the central west, but is almost as pronounced in eastern territory, where there have been sharp advances in quotations for delivery during the last half of the year. In eastern territory, Buffalo iron for last half has been sold at $14, furnace, for No. 2X. A large buyer in eastern territory is about to close for 5,000 to 10,000 tons of mixed grades for last half delivery. The Tata Iron & Steel Co., of India, is endeavoring to dispose of from 10,000 to 30,000 tons of off iron in this country, but nothing definite has developed in the negotiations. A limited tonnage of Indian iron delivered at San Francisco about a year ago was on a basis about equivalent to the price at which domestic iron was selling on the coast.

Price Concessions

The effort of leading companies to establish a price of 1.25c, Pittsburgh, on plates, shapes and bars, has not succeeded, as lower prices are constantly developing on desirable tonnages. These concessions usually take the form of ignoring the Pittsburgh base in making quotations, which net the mills absorbing some of the freight a fair profit. For example, 1,000 tons of shapes and plates sold to buyers at Welland, Ont., are understood to have been placed on a basis of 1.15c, Pittsburgh, but the sale was made by a nearby American mill. On a sale of 2,000 tons of reinforcing bars at Toledo, at least a part of the freight was absorbed by a not far distant mill.

Railroad Buying

The placing of orders by railroads has not developed rapidly and probably will not as long as rate questions remain unsettled. There is, however, more activity in some directions and new inquiries for cars aggregate about 6,000, of which 3,650 are for the New York Central. The Illinois Central railroad, which recently ordered 17,500 tons of rails, principally for the Central Railroad of Georgia, has increased its rail order to 67,000 tons. An order for 5,000 kegs of spikes was placed at Cleveland by a leading railroad and follows a similar order placed a few weeks ago. The American Bridge Co. will probably obtain 50,000 tons or more from the general contractors for third-tracking elevated lines in New York. Of the Illinois Central rail order, 25,000 went to the Illinois Steel Co., 20,000 to the Tennessee company and the remainder to independent mills. The Great Northern has purchased 15,000 tons of rails, of which 5,000 went to the Illinois Steel Co. and the remainder was divided between two independent companies. The Buffalo, Rochester & Pittsburgh has ordered 5,000 tons from the Carnegie Steel Co., and has awarded some additional tonnage to independents. The Steel Corporation has taken 75,000 tons of rails for South American roads.

Plates and Shapes

Inquiries for structural material now pending in the east include 75,000 tons for subway and elevated work, and from 25,000 to 30,000 tons for other projects, of which the largest is the Widener building, Philadelphia, which will require about 9,000 tons. The Norfolk & Western is considering the building of 5,000 cars in its own shops, which will require at least 50,000 tons of steel. The navy department will soon call for bids on 8,000 tons of steel for a transport and supply boat to be built in the Philadelphia and Boston navy yards. It is expected that about 8,000 tons of steel for four tank boats, recently reported as having been awarded to a Philadelphia ship yard, will probably go to a Pittsburgh mill. The Standard Oil Co. is inquiring for 900 tons of plates at Cleveland and is reported to be in the market for considerable more material of various kinds.

Scrap

The dangers of speculative buying and too rapid advance of prices are strikingly illustrated in the case of scrap, which has slumped suddenly in Pittsburgh, Chicago and other leading centers. Dealers who found themselves short when the market began to advance paid fancy prices and contributed to the present demoralization. Railroads of Chicago have thrown upon the market a large, but by no means unprecedented, tonnage of old material.

Pittsburgh Sentiment is Still Cheerful

In Spite of Some Unfavorable Developments, Including Weakness in the Scrap Market—Some Unusual Factors

BY C. F. WILLIAMS

Office of THE IRON TRADE REVIEW,
2148-49 Oliver Bldg.,
Pittsburgh, Feb. 24.

Suspension of freight rate tariffs asking advances in the eastern part of the United States, official approval of the present rate on coal shipped from the Pittsburgh district to the Mahoning and Shenango valleys, conflicting information regarding proposed "spotting" charges by the railroads, heavy snow storms, which paralyzed traffic in some sections, and the observance of Washington's birthday have all had a direct or indirect influence upon the trade this week, and have contributed to make the last seven days rather uneventful in the steel market proper. New buying, throughout the country, has fallen off to some extent, and it is not believed activity will again characterize the trade until consumers have fully specified against contracts placed in January and the early part of February. Specifications for finished steel products continue to come out at a satisfactory rate, and, much to the encouragement of business in general, steel plant operations are gradually being increased; mills, the more important ones, at least, are operating at between 65 and 80 per cent; some are running at almost full capacity. On the other hand, some industries, including many foundries and shops supplying the railroads, are not doing so well. Sentiment continues decidedly cheerful and mill managers conscientiously believe higher prices will prevail before the end of the half, despite present irregularity which has been slowly disappearing. The scrap market, which had been displaying strength, has become weak and irregular.

Pig Iron

After a few weeks of heavy buying, the pig iron market is quiet, but prices are being well maintained and some grades show a decided tendency toward higher levels. The American Steel Foundries, which has been inquiring for second quarter needs for shops at Sharon and Alliance, will buy through the year if attractive prices are offered, and the United Steel Co., Canton, O., has inquired for 10,000 tons of basic for last half shipment. Basic is being held at $13.25 and Bessemer at $14.25, valley. Malleable, foundry and gray forge are quiet, but leading sellers are refusing to shade maximum prices.

Ferro-Alloys

It is understood that some ferromanganese has been offered at $38, seaboard, within the last few days, but no trace of sales can be found. Lower grades of ferro-silicon are irregular, and there does not appear to be a uniform quotation for any particular grades. Prices offered by THE IRON TRADE REVIEW represent the market as accurately as possible.

Sheets and Tin Plate

Sheet and tin plate mills are operating at almost full capacity, and shipments are practically normal for this time of the year. Pressure for second quarter sheets has been heavy, and it is understood some tonnage has been sold for delivery after April 1, although none of the larger mills has formally opened books beyond that date. Maximum prices are being firmly held by leading makers, but irregularity features the trade in some centers. Tin plate is quiet with reference to new sales.

Plates and Shapes

Inquiry for railroad cars gives better tone to the market for plates and shapes, both of which are comparatively quiet. Plates continue to be the weakest item on the plate, shape and bar list, and the 1.20c quotation is shaded in isolated instances.

Rails and Track Material

This department of the market still lags, and were it not for the general belief that railroad managers will be forced to buy sooner or later, manufacturers of rails would feel discouraged. Spikes are more firmly established at prevailing quotations. Other track fastenings are unchanged.

Semi-Finished

The market for billets and sheet bars is quiet, but prices appear firmer. Sheet bars have been offered, for second quarter delivery, at $23, mill, Youngstown. Pittsburgh manufacturers do not appear anxious to sell for any delivery, and, it is believed, the next sale of importance will establish advanced quotations. Muck bar is quotable at a spread from $28 to $28.50, Pittsburgh, or 50 cents a ton higher than previously. Wire rods are quiet, and unchanged.

Bars, Hoops, Bands and Shafting

Specifications for steel bars continue fairly satisfactory. Sales at less than 1.25c are not so frequent, although tonnage for immediate shipment still is available at 1.20c. Hoops and bands are not so active as a fortnight ago, but prices are being well maintained. Demand for cold rolled shafting is heavier, and prices are being better maintained. The 65 off price is disappearing rapidly.

Tubular Goods

Manufacturers of iron pipe probably will not change discounts until spring buying is well under way, despite contrary reports heard a week ago. Demand for both iron and steel pipe is heavy, and, generally speaking, mills are operating at full capacities. Previous tonnage and shipment records are being broken by some makers. Demand for boiler tubes is relatively light, but prices are better maintained than a fortnight ago.

Coke

Standard grades of Connellsville furnace coke are stronger than a week ago, especially for immediate shipment. Leading operators are holding fuel at $2, ovens, as a minimum, and some are refusing to shade $2.10, ovens. Box car furnace coke, for shipment the remainder of the year, has sold at $2.25, ovens. Foundry coke is being held at $2.75, ovens, for best grades, although some grades are selling at $2.50, ovens, and even less. The blowing in of two steel works furnaces in the east (and it is said by a reliable source that two stacks contemplate renewing operations shortly), will help the furnace coke market. The Connellsville Courier, for the week ending Feb. 14, says production was 300,250 tons, a decrease of 4,725 tons, compared with the week before.

Old Material

The market for iron and steel scrap, which had been advancing almost by leaps and bounds, apparently struck a snag a couple of days ago. Heavy melting steel is not above $12.50, or $1 a ton less than it commanded a week ago, and other grades are correspondingly weak. Several dealers found themselves "short" when the market first displayed slight strength a few weeks ago, and started to buy rather excitedly. As generally is the case with a runaway market, a sudden reversal occurred.

Heavy Specifications Filed at Chicago

While Lull in Buying Continues—Steel Corporation Increases Activities at South Chicago and Gary—Scrap Market Softens

BY G. H. MANLOVE

Office of THE IRON TRADE REVIEW,
1521-23 Lytton Bldg.,
Chicago, Feb. 24.

Conditions in the steel market in the Chicago district appear to have held steadily during the past week. The let-up in buying has continued. Specifications, however, are in good volume and mills are operating at increased capacity. The reaction from the activity of January was expected and resumption of buying probably will not take place until near the end of March. Increase of small structural lettings in widely scattered sections is an encouraging feature in the plate and shape market. The United States Steel Corporation has increased its blast furnace capacity at South Chicago and Gary until approximately 75 per cent is in operation. Seven of the 11 stacks at South Chicago and six out of the eight stacks at Gary are now active. The open-hearth capacity also is larger and 30 of the 42 open-hearth furnaces at the Gary plant are active.

Men have been taken back at the Gary plants until about 7,200 are employed out of a normal total of approximately 8,000. About 6,000 additional men are employed in other Corporation subsidiaries at Gary.

Pig Iron

Considerable inquiry for small lots of northern and southern pig iron are in the hands of dealers. The market continues quieter than has been the case since the first of the year and while some tonnages of considerable size are pending, most of the inquiry is widely scattered and small. Dealers continue to hold for $14.25 through first half and no quotations under $15 for last half appear to have been made. Inquiry for last half is not large and much of it tentative. Some small sales have been made for last half at $15, Chicago furnace, but not much activity for this delivery is expected for some weeks.

The inquiry of Parlin & Orendorf, Canton, Ill., for their malleable iron requirements through this year, over 3,000 tons, has not been closed. A small tonnage of southern iron and a small order for northern iron have been bought, but both were for nearby delivery.

Southern iron is characterized by small tonnage inquiries. One interest represented here disposed of about 2,500 tons last week, mostly to central Illinois melters. The lowest price of southern foundry No. 2 appears to be $10.75, Birmingham, and dealers claim that no iron is now available at $10.50, Birmingham, while most makers hold for $11, Birmingham, and a few brands are held at 50 cents higher.

Lake Superior charcoal iron appears somewhat stronger and while $15.50 appears to be the ruling quotation, $15.75 is being asked by some interests.

Softness in the scrap market is curtailing the sales of high sulphur iron to some extent.

Merchant Bars

The situation in iron and steel bars continues strong, with bar iron quoted at 1.20c and soft steel bars, bands and small shapes at 1.38c to 1.43c. Specifications continue in excellent volume and some local mills are operating at somewhat larger percentage of capacity than since the slack period early in the winter. Business at 1.20c, Pittsburgh, for steel bars, is scarce and it is not believed that any considerable tonnage is still available at that level. There has been a slight falling off in new orders, but some inquiry for second quarter remains in the market and 1.30c, Pittsburgh, is generally quoted for that delivery.

Plates and Structurals

Demand for small structural tonnages from widely separated portions of the country continues the feature of the structural market and apparently is the result of an easier money market. Large tonnages are notable for their absence, but some considerable enterprises are pending at present. Plates continue to be somewhat weaker than other finished steel products and are quoted at 1.20c, Pittsburgh, while a possibility remains of tonnage being taken at 1.15c, Pittsburgh. Structurals are quotable at 1.25c, Pittsburgh, with some business still quoted at $1 a ton lower.

Sheets

With the possible exception of wire, steel sheets are apparently the strongest feature of the steel market. No. 28 gage black are quoted at 1.95c to 2.00c and No. 28 gage galvanized at 2.95c to 3.00c, while some tonnage has been taken recently at $1 a ton lower.

The full sheet capacity of the Inland Steel Co. is in operation this week after an interruption, while motor drive was being substituted for steam power. This doubles the recent capacity of this plant.

Wire Products

No letup in the wire market is becoming apparent and the demand continues strong. Makers assert the recent advance to 1.60c for nails is being well maintained and in some quarters it is held that another increase of $1 per ton may be made about March 1. Business in wire is being done at 1.35c to 1.40c.

Cast Iron Pipe

Somewhat better business was moved in cast iron pipe the past week. Prices remain the same as the past fortnight. The United States Cast Iron Pipe & Foundry Co. has taken 700 tons at Kansas City and is low bidder on 2,600 tons at Akron, O., the award on the latter not having yet been made. The American Cast Iron Pipe Co. has taken 450 tons for Rockford, Ill. The Lynchburg Foundry Co. has taken 600 tons at Grand Rapids, Mich. Bids have been taken on 300 tons for the South Park Board, Chicago. Dayton, O., will open bids Feb. 28 on 600 tons and Springfield, O., will award 125 tons March 2.

Old Material

Recession in the iron and steel scrap market after the pause of last week has been rapid. Declines from 50c to $1 have been registered in many of the items. A deluge of railroad scrap has been offered this week, aggregating almost 25,000 tons. This has had the effect of increasing the supply vastly and further declines in price are expected at once. The market appears to be suffering from the result of more or less speculative buying and holding and liquidation of large stocks appears imminent. The largest list offered this week is by the Baltimore & Ohio, aggregating 10,000 tons. This includes 3,000 tons of steel rails, 1,000 tons of old wheels and 1,000 tons of railroad wrought. The Chicago, Rock Island & Pacific railroad offers 4,000 tons, included in which is 1,000 tons of rails. The Chicago, Burlington & Quincy asks bids on 3,000 tons, the Northern Pacific on 600 tons, the Grand Trunk on 2,600, Chicago, Milwaukee & St. Paul on 3,000 tons, the Vandalia on 500 tons and the Lake Shore has issued a "blind" list without tonnage being mentioned.

Advancing Pig Prices at Cleveland

In Spite of a Dull Market—Pittsburgh Basis on Finished Materials Ignored on Competitive Business

BY GEORGE SMART.

Office of THE IRON TRADE REVIEW,
Penton Bldg.,
Cleveland, Feb. 24.

In the Cleveland district, the unusual spectacle of prices of pig iron being advanced during a dull period is being witnessed. The Cleveland Furnace Co., which has been quoting $14, delivered, Cleveland, for No. 2 foundry, and $13.50, furnace, for delivery outside of the city, has advanced to $14, furnace, for delivery in the city or to distant points, and it is understood that Corrigan, McKinney & Co. will also adhere to this quotation. A leading valley interest is about to advance to $14, valley, for No. 2. These and other price advances which are likely soon to be announced are due to a careful investigation of present conditions which has been made by the pig iron makers in the central west outside of Chicago. This investigation disclosed that unfilled orders on books of the producers are very large, but that prices are extremely unsatisfactory, and in many cases, below cost. Hence the determination to ask a reasonable price.

Iron Ore

Neither sales agents nor furnace interests are paying any attention to the ore situation and all of them would prefer that the whole subject be held in abeyance until April and to let it go at that. The Buffalo Steamship Co., owning three vessels and chartering one, has taken contracts to move about 1,000,000 tons of ore at last season's rate, that is, 55 cents from the head of the lakes.

Finished Material

There has been some slowing down in new bsiness and specifications, but this was not unexpected and most of the mills are well satisfied with present conditions. The 1.25c, Pittsburgh, price on plates, shapes and bars, which a number of the leading companies endeavored to establish, has not been rigidly adhered to by some of the smaller companies, but usually when concessions have been made, they take the form of disregarding to some extent the Pittsburgh base and the mills making the concessions obtain a fair price at their plants. An example of this kind is furnished by the sale of 1,000 tons of shapes and plates for dredges to be built by M. Beatty & Son, Welland, Ont., and the Polson Iron Works, Toronto, This tonnage is said to have been placed on a basis of 1.15c, Pittsburgh, but was taken by an American mill not far distant from Welland. Another case is that of 2,000 tons of reinforcing bars sold to Henry J. Spieker & Co., Toledo, for a building to be erected by the Willys-Overland Co. Keen competition developed for this tonnage and it is both affirmed and denied that 1.15c, Pittsburgh, was made. If this quotation was made, it was by a mill which would net more than would a mill in the Pittsburgh district. The Standard Oil Co. is in the market for 900 tons, of which 95 per cent is plates, largely for tank work, although there is some fire box material. Among pending tonnages of reinforcing bars are the 500 tons for the Cleveland Akron Bag Co. building to be erected in Cleveland, and 250 tons for the Gunther building. The contract for the Lincoln Memorial, Washington, involving 489 tons of plates for caissons, is about to be awarded. A Cleveland firm is understood to be low bidder. Recent railroad orders include 5,000 kegs of spikes for a leading system, placed a few days ago, following a similar order placed last month. Mills have given protection for several thousand tons of structural material on work on which Cleveland firms will bid. There is considerable secrecy as to the details of some of these transactions, especially those involving railroad work.

Old Material

Prices of many grades of scrap have declined from 50 cents to $1 a ton in the past week or ten days. A short time ago, melting steel consumers placed good orders at $12 to $12.50; today one mill offers $11 and the other $11.50. Both new and old busheling have declined 50 cents. Turnings have weakened still further. Mills do not seem eager to buy, but trading among brokers and dealers has been active.

Eight Hour Bill.—A proposed law, applying to employer and employe alike and providing that no person shall be employed more than eight hours in any one day or 48 hours during one week, has been put forward by the radical Socialist element of the state of Oregon and will be voted on at the next state election. The eight hours' work must be done in nine consecutive hours.

FIRMER PRICES

Are Being Asked by Pig Iron Sellers in the Buffalo District.

BY FRANK R. DOLBEE

Office of THE IRON TRADE REVIEW,
Buffalo, Feb. 24.

Pig iron producers are firming up on prices. A raise of practically 25 cents per ton on all grades has taken place in the past week. The sales of the week, taken as a whole, in and out of the district, amounted to about the average booked for the past few weeks, but the sales for the trade of the Buffalo territory amounted to slightly less than they did a week ago. There is a pressure on the furnace for iron under contract, and practically every day brings in its quota of the tidings that consumption conditions are improving. Some foundries are drawing upon their second quarter iron to fill out first-quarter needs. There are, however, a number of melters still below normal active capacity. One of the leading interests reports that it is approaching the point of being sold-up for first half needs.

Finished Material

Specifications continue to come in in good volume, while the inquiry and the sales have slackened slightly with the disappearance of the speculative buying activity that prevailed for the past few weeks. Principal interests are maintaining prices very firmly at 1.25c base, on bars shapes and plates for immediate needs and first half requirements. Prices are being maintained, and the volume of business is reported good in sheets, nails and wire products.

The scrap dealers of the district report a steady demand for practically all grades of scrap, but in a market that has undergone a degree of settling. The artificial activity, in anticipation of continued advances in prices, has disappeared and trading has assumed a healthy tone. Prices remain the same.

The annual stockholders' meeting of the Republic Iron & Steel Co. will be held at Jersey City, April 15. The directors of the company have declared the regular quarterly dividend of 1¾ per cent on its preferred stock payable April 1 to holders of record, as of March 17.

Lull in Pig Iron Buying at Cincinnati

But Prices Are Strong and Are Tending Upward—Coke Market is More Active

BY S. G. BACKMAN

Office of THE IRON TRADE REVIEW,
503 Mercantile Library Bldg.,
Cincinnati, Feb. 24.

The pig iron market is experiencing a lull and the aggregate of sales is much below that of two or three weeks ago. General inquiry is very scarce, and most of the business is being secured by solicitation. New contracts usually call for small lots for near-by shipments as requirements actually demand. The feeling among the dealers and producers remains very optimistic. Prices are strong, and in some cases show a decided tendency to advance, especially throughout the south.

The minimum price on southern No. 2 foundry iron is $10.50, Birmingham basis, for Tennessee makes, and $10.75, Birmingham, for Alabama makes, for first half shipment. This lower price in Tennessee refers chiefly to some warrant iron of the Dayton Coal & Iron Co., at Dayton, Tenn., which is fast disappearing, and which is being held at this figure for territory east of the dividing line between Ohio and Indiana only. West of this line this iron is selling at $10.75, Birmingham basis, because of a smaller differential over Alabama grades. Furnace iron is obtainable in both Tennessee and Alabama at $10.75, Birmingham basis, for shipment into all parts of this territory. The majority of makers in both states are holding firmly at $11, Birmingham basis, for either prompt or first half shipments, and in several cases this price has been advanced to $11.25 and $11.50, Birmingham basis, for the second quarter.

Southern Ohio No. 2 foundry iron is $13, Ironton, for either prompt or first half shipment. This price has prevailed for some time, despite numerous efforts of buyers to contract at lower figures. The Ironton, O., furnace has blown out for repairs, leaving the following still in blast in the southern Ohio district: Ironton, O., Marting and Union; Culbertson, O., Lawrence; Hanging Rock, O., Hanging Rock; Wellston, O.; Wellston, two stacks; Jackson, O., Globe, Star and Jackson, which are all on silvery iron; and Columbus, O., one stack out of two. There is also one stack on silvery iron at Ashland, Ky.

Sales during the past week include 1,000 tons of northern iron to an engine manufacturer at Evansville, Ind., and 750 tons of charcoal iron to a Louisville, Ky., melter. Inquiries include 1,000 tons of charcoal iron and 500 tons of silvery iron from a Michigan melter.

Coke

The market is a little more active, especially on foundry coke. Requisitions to forward shipments on old contracts have been better during the past two weeks than at any time for the last seven months. New orders are scattering, but the aggregate tonnage is gaining each week. Unfavorable weather conditions have made it difficult to ship during the past few days and dealers are receiving numerous requests to forward requirements in certain cases as quickly as possible, which indicates that there is a large amount of pig iron being melted. Foundries in this city are not running over 50 per cent of their total capacities. The general report throughout this territory is that stove foundries are buying more coke than those doing a jobbing business. Prices are unchanged, and are firm, principally because production and consumption have become more nearly equalized than for a long time.

Finished Material

The sheet market is strong, and mills in this territory report a very good business during the past week. Sheared plates are steady, but are not as active as sheets. Nearby makers have advanced the price on wire rods to $28.20, Cincinnati, in comparison with $27.70, Cincinnati, which was quoted last week. Billets have been quiet during the past few days, and are given at $22.20, Cincinnati. Blue annealed sheets No. 10 gage are quoted at from 1.60c to 1.65c, black sheets No. 28 gage at from 2.15c to 2.20c, and galvanized sheets No. 28 gage at from 3.15c to 3.20c, all Cincinnati basis.

Warehouse business has been temporarily handicapped by recent heavy snow storms, which have made it necessary to postpone deliveries in a number of cases. Sales do not show any improvement over those of last week, but the market is holding its own. Specifications and requisitions to forward shipments on old orders have improved. Steel bars are given at from 1.75c to 1.90c, iron bars at from 1.70c to 1.80c, and plates and shapes at from 1.85c to 2c. All forms of cold rolled shafting are quoted at from 55 to 58 off.

Old Material

Lack of demand, and a gradual disappearance of the optimistic feeling that has been very much in evidence here since the first of the year, has weakened the scrap iron market during the past week. Prices are unchanged, but there is no tendency to advance, and in a few cases, such as machine shop turnings and cast borings, a slight decline may occur at any time. The buying of railroads has been very disappointing since the first of the year, and local foundries have not increased activities. The only good buying recently has been done by rolling mills in this territory, but the aggregate of tonnages taken have been small in comparison with the large surplus of scrap on hand in dealers' yards and available throughout the rural districts. The best sellers during the past week have been No. 1 machine cast, bundled sheet scrap, No. 1 busheling and machine shop turnings.

QUIET AT ST. LOUIS

Pig Iron Transactions Few and for Small Lots.

BY E. C. ERWIN

Office of THE IRON TRADE REVIEW,
St. Louis, Feb. 24.

Quietness pervades all branches of the iron market in the St. Louis territory. Pig iron transactions last week were confined to small tonnages, and very few of them, and there is scarcely any business in sight today. Southern No. 2 is still held at $11 to $11.50 by most of the dealers, but it is generally conceded that one firm is making a price of $10.50 on a special brand. Northern iron is quoted at $14 to $14.50, Chicago, and $13.50 to $14, Ironton.

The demand for coke has dropped off to the minimum. Connellsville 72-hour foundry grades are held at $2.50 to $2.75, and 48-hour furnace at $2 to $2.50. Virginia brands are quoted at about the same prices as Connellsville.

A number of scrap lists will be out Tuesday, but very little buying is going on. Better conditions are expected soon.

The Colonial Brass Co., New Haven, Conn., has increased its capital stock from $10,000 to $50,000.

Eastern Buyers Specifying Liberally

But New Buying of All Products Has Decreased— Norfolk & Western May Build Five Thousand Cars

BY C. J. STARK

Office of THE IRON TRADE REVIEW, 326 Real Estate Trust Bldg., Philadelphia, Feb. 24.

New buying of all iron and steel products in the eastern Pennsylvania market is on a smaller scale. The favorable aspect of the situation remains the activity of consumers in drawing against contracts, showing that there was not much speculation in the recent movement. Mill operations are fair, but they show the lack of railroad buying. More than 25,000 tons of pig iron were sold in the week. Basic has been sold at a further advance, or at $14.50, delivered, Brokers are buying scrap less actively, but values hold and steel scrap continues to move to Pittsburgh, where prices are better than in the east.

Pig Iron

General buying is not so good, as buyers now appear well covered. The aggregate of sales, however, still makes a very fair showing, upwards of 25,000 tons in all grades having been transacted in this district in the week. Prices show some further gain in strength. Eastern basic has been sold at $14.50, delivered, or 25 cents higher than the maximum price in the recent heavy movement of this grade. The Harrisburg Pipe & Pipe Bending Co., Harrisburg, in the week bought 2,500 tons of basic for second quarter at $14.50, delivered. This buyer may take other tonnage. Foundry iron is gradually firming up. One leading seller who has been accepting below that figure now is holding No. 2X at $14.25, furnace, or $14.90, Philadelphia. Other brands are reported available at $14.85, delivered, and one buyer states he bought No. 1X below that figure the past week. On the other hand, sales of No. 2 plain at $14.50, furnace, are noted. The Pennsylvania railroad placed 5,700 tons of coke iron with central Pennsylvania makers and 1,700 tons of charcoal iron with Lake Superior furnaces for second quarter delivery at Altoona, representing the maximum quantities of its recent inquiry. The Reading Iron Co. took 5,000 tons of early standard forge at $14, delivered. The Standard Cast Iron Pipe & Foundry Co., Bristol, Pa., bought 5,000 tons of No. 3 and forge for shipment up to July at $14.50, delivered. Another eastern Pennsylvania pipe shop bought 500 tons and some of the larger consumers of this class now are sounding the market. Virginia iron is unchanged at $12.75, furnace, for No. 2X for prompt or first half delivery. The Stanley G. Flagg Co., Philadelphia, took 550 tons of prompt malleable at $15.25, delivered, and a Temple, Pa., buyer wants 300 tons of this grade. Small sales of standard low phosphorus are reported at $21, Philadelphia.

Iron and Steel Bars

Not much new buying now is going on in steel bars, but specifications are coming in very favorably. The market remains quotable at from 1.20c to 1.25c, Pittsburgh, or 1.35c to 1.41c, Philadelphia. While some shafting makers are holding prices more firmly, from 63 to 64 off still can be done. Some recent betterment in bar iron is maintained, but prices are unchanged at 1.20c to 1.25c, mill, or 1.27½c to 1.32½c, Philadelphia.

Plates and Shapes

The Norfolk & Western railroad now is considering the building of 5,000 or more cars in its own shops, and if it decides to go ahead with the work, at least 50,000 tons of steel will be required. The government is taking bids on a number of coal barges to require 1,000 to 1,200 tons. The Southern railroad inquiry for 4,800 tons of car steel still is pending. The Worth Bros. Co. is the low bidder on 560 tons of plates for Panama shipment. Bids shortly will be asked by the navy department on about 8,000 tons for a transport and a supply ship, which it has decided to build in the Philadelphia and Boston navy yards. About 8,000 tons of steel for four tank boats, recently reported as having been placed with a Philadelphia yard, are expected to go to a Pittsburgh maker.

Plate tonnage being booked in the east is reported by makers to be holding up to the recent rate. The business is coming from many miscellaneous sources. The usual eastern market price is 1.20c, Pittsburgh, or 1.35c, Philadelphia, but this probably can be shaded about $1 on a very desirable specification.

Specifications for structural shapes with eastern mills are keeping up very well, but new buying is quieter. A good tonnage is in prospect in this district. Prices seem firmer and 1.20c, Pittsburgh, or 1.35c, Philadelphia, is minimum to the general trade, though an attractive tonnage for prompt specification would bring out $1 less.

Sheets

Forward buying still is slow but early new business and mill orders against contracts are fairly steady. Operations are unchanged. More tonnage is being booked at 1.45c, Pittsburgh, or 1.60c, Philadelphia, for No. 10 gage, and 1.40c, Pittsburgh, is exceptional.

Semi-Finished Steel

Small lots of billets, as a rule, are being inquired for, but buyers are ordering well against previous commitments. The total tonnage is no larger. Eastern makers quote more firmly rolling billets at $21 to $22, Pittsburgh, or $23.40 to $24.40, Philadelphia.

Old Material

The brokers having covered on their pressing orders, now are less active in the market, and as eastern steel makers still hold off from buying, the scrap situation superficially seems easier. Underlying conditions, however, reflect considerable strength and several grades are a little higher, though the general advance seems to have been checked. Higher prices at Pittsburgh continue to attract eastern steel in which sales to brokers were made out of the territory in the week at $13.25, delivered Pittsburgh, and $13.50, delivered, is reported. Turnings have been in some demand up to $9.25, delivered. Brokers have paid up to $12, delivered, in covering orders for wrought pipe.

Ore Companies Re-elect

The retiring directors and officers were re-elected at the annual meetings, recently held by Witherbee, Sherman & Co., Inc., and the Port Henry Iron Ore Co. The officers of Witherbee, Sherman & Co. are: F. S. Witherbee, president; E. A. S. Clarke, vice president; W. C. Witherbee, treasurer, and L. W. Francis, secretary. These officers, with Geo. C. Foote and Moses Taylor, compose the board of directors. The officers of the Port Henry Iron Ore Co. are: Jos. T. Tower, president; W. C. Witherbee, vice president; H. M. Brinsmade, secretary and treasurer. The other directors are James A. Burden and E. S. Atwater.

Sharp Advances in Pig Iron Prices

As Quoted in New York for Last Half—Company in India Would Like to Dispose of Some Off Iron

BY C. J. STARK

Office of THE IRON TRADE REVIEW,
503-4 West St. Bldg.,
New York, Feb. 24.

Some tentative inquiries for foreign ores continue to be put before sellers by eastern Pennsylvania consumers, which apparently are intended merely to sound out the market. No sales are resulting and the present indications are that there will not be much buying of foreign ore until the coming season's schedule on lake ores more clearly is defined. The Bethlehem Steel Co., as previously reported, is concluding negotiations in Europe for chartering ships to bring in its Chilean ore, but details have not progressed to the point where a definite announcement can be made. Some new ship construction may be involved.

Pig Iron

Some consumers of pig iron the past week began to put out inquiries for their last half requirements. When the furnaces have been willing to quote, sharp advances, usually, have been asked. Buffalo iron for last half has been quoted at $14, furnace, for No. 2X and some sales have been made upon this basis. At the same time, one or two eastern Pennsylvania producers have quoted prices practically the same as for first half. A large buyer in this territory is about to close for 5,000 to 10,000 tons of mixed grades for last half delivery at several tidewater plants. The Bridgeport Malleable Iron Co., Bridgeport, Conn., has purchased 1,000 tons of Virginia No. 2X for first half at $12.75, furnace. A large Jersey buyer still is taking tentative bids on 1,000 tons of foundry grades and may purchase a round tonnage. A Phillipsburg, N. J., pipe maker is figuring on several thousand tons, in addition to recent purchases, and a Cartaret, N. J., buyer has closed for 500 tons of No. 2X. A Bridgeport, Conn., inquiry for 1,000 tons of high silicon iron, still is pending. Tidewater prices remain at $14.75 to $15.25, for No. 2X. Buffalo iron continues to display a stronger tone and some makers are moving away from the $13 level. An interesting development of the week was the announcement by advices from abroad that the Tata Iron & Steel Co., Sini, India, is negotiating with sellers in this country to import 10,000 to 30,000 tons of iron of medium silicon foundry, off basic and off malleable quality. Nothing yet has developed from these negotiations and as far as learned, no prices have been quoted. Some authorities in the iron trade recently have stated that this Indian iron can be manufactured at $5.50 a ton and can be laid down at Calcutta at about $6 a ton. The freight rate from Calcutta to New York has not been determined.

Ferro-Alloys

There seems no longer any doubt in the ferro-manganese trade that at least 75,000 tons of this material was contracted for during the recent selling movement. It had been thought in certain quarters that this estimate previously made by THE IRON TRADE REVIEW, was exaggerated, but more complete information, now available, fully has confirmed it. The purchase of such a tonnage implies that the sales during the rest of the year will be comparatively light. At this time, only odd lots are pending. The market remains at $39 to $40, seaboard. Several inquiries for 50 per cent ferrosilicon, including one for 100 tons, are current.

Iron and Steel Bars

A leading German mill has been making renewed efforts in this and other eastern seaboard territory to interest domestic consumers in foreign steel bars. Quotations of about 1.25c, base, tidewater duty paid, with a schedule of extras lower than that of domestic mills, are being made. As far as can be learned, however, the efforts of this German maker have not met with much success, notwithstanding the advantage in price at tidewater of about $2 a ton. It is reported that about 1,000 tons have been booked by this seller. New orders for steel bars are lighter, but specifications are active and the mills are enjoying good operations. Prices continue at 1.20c to 1.25c, Pittsburgh, or 1.36c to 1.41c, New York. Iron bars show little change and remain at 1.20c to 1.25c, eastern mill.

Plates and Shapes

Prospects are better than current new business in structural shapes in this territorq. Specifications against the orders placed with the mills in January, however, are coming in very freely. Prices, usually, are held at 1.20c, Pittsburgh, or 1.36c, New York, but on attractive specifications, this minimum still can be shaded with certain mills.

Pittsburgh plates makers report they are quoting 1.25c or 1.41c, New York, but eastern Pennsylvania mills still will do 1.20c, Pittsburgh, and even less on an attractive specification. New orders are fewer. The mills are able to keep up operations on old business.

Cast Iron Pipe

Low prices still are being named by some eastern makers, despite the liberal tonnage of new business. Some recent quotations have netted below $19, at the foundry. The Boston requirement of 3,550 tons, upon which bids were entered a week ago, is up for reletting on Feb. 27. Hartford, Conn., asks 1,430 tons for bids March 2. The Donaldson Iron Works has 415 tons of 12-inch for Concord, N. H., at $21.49, delivered. The Canadian Iron Corporation is the low bidder on 6,750 tons for Montreal. American makers were outbid $1 to $2 a ton on this business. In private lettings, the United Gas Improvement Co., Philadelphia, has placed about 2,500 tons of 4 to 30-inch; the Providence Gas Co., Providence, R. I., 584 tons, with the Warren Foundry & Machine Co., and the Municipal Gas Co., of Albany, 780 tons of 6, 12 and 16-inch, the latter being reported to have gone to R. D. Wood & Co. at $22, delivered, for the 6-inch, and more than 50 cents less for the 12 and 16-inch.

Old Materials

Wintry weather conditions have tied up quite completely the movement of scrap into and out of the yards and into consumers' plants. This congestions has tended to make the market quieter. Eastern steel makers still hold off, but one of them has been increasing his offers for heavy steel to $11.50, delivered. Pittsburgh consumers and brokers are offering less in the market for steel. Sales now are noted at $13, delivered, whereby eastern dealers were able to obtain $13.25, delivered, and in one or two cases $13.50, delivered, a week ago.

A number of changes have been made in the management of the Wm. L. Gilbert Clock Co., Winsted, Conn. E. W. Farmer and Allen Hubbard, of Boston, both sons-in-law of the president, James G. Woodruff, have been made directors. Frank R. Alvord, long superintendent, has resigned and T. W. R. McCabe, formerly chief mechanic, is now works manager. Geo. B. Woodruff, son of the president, takes charge of the western business of the company, with headquarters in Chicago.

Birmingham Furnaces Adhere to Prices

For Southern Delivery, for Which $11 is the Minimum — Fair Sales and Inquiries for First Half

Office of THE IRON TRADE REVIEW,
Birmingham, Ala., Feb. 24.

Local pig iron producers are still adhering strictly to a basis of $11 per ton for any tonnage offered for southern delivery, and the sale of a round lot, involving some 8,000 tons, at figures better than there has been effected within the past week. This tonnage was entered at a price of $11.50 per ton for No. 2 foundry at Birmingham, and was of a favorite brand and for a particular customer. Delivery specifications calling for shipment within the second quarter were an especial feature of the sale. With the entering of this last tonnage, under the prevailing conditions, furnace interests express more hope of a market in which prices will make the production of foundry pig iron more profitable to them than under the present ruling figures. A fair inquiry for all grades continues in evidence, while the bulk of the tonnage sought is still coming from southern territory. The reported sales for the week are about as follows: Nine thousand five hundred tons in quantities ranging from 250 to 500 tons at $11 to $11.25 per ton, No. 2 foundry basis, f. o. b. Birmingham, and for delivery during the first half; 500 tons of high manganese, low silicon iron at the usual premium for this brand, analysis governing, and the single lot of 8,000 tons as above mentioned. It is interesting to note that none of the sales of the week calls for a delivery later than the first half of the year, and practically no tonnage for third quarter shipment has yet been entered. A basis of $11.50 per ton seems to be the most popular consideration among the trade for last half requirements, and it is probable that several round tonnages will be entered at these figures shortly. However, producers have been very slow to express themselves until this time, and seem to be willing to wait, and to allow prices to be governed by the demand and existing local conditions at that time, rather than at the present. Shipping departments of all of the furnace interests are fairly busy, and the movement of pig iron from local yards is sufficient to take care of the bulk of the daily output.

Cast Iron Pipe

The market in this territory has shown apparently no signs of betterment during the week just past, and still remains uncertain. Although no definite information can be obtained as to specific lettings, it is generally believed that at least one or two of the plants have acquired attractive tonnages within the week. The contracting for the requirements of Tampa, Fla., involving some 2,000 tons, is reported as having been affected, and an attractive tonnage for Havana, Cuba, is also reported as having been awarded to a local manufacturer in competition with several foreign bidders. However, some of the manufacturers report no new business whatever, but continue to operate to capacity. A fair amount of the product from all of the plants goes forward daily, although shipments are far from normal.

Old Material

Report is made of a better demand for old car wheels, and sales of heavy machinery cast during the week, as well as borings and stove plate, continued to move these grades. The aggregate of sales by local dealers within the week is approximately 1,000 tons. The small increase in sales as shown by reports for the last four to six weeks is gratifying to dealers, and they are all hopeful of better conditions in the scrap market, in view of the more stable attitude of the pig iron market, even at this small weekly increase.

Opens Office as Production Engineer

William D. Mainwaring, for the past 11 years associated as chemist and metallurgical engineer at the Detroit plant of the Railway Steel Spring Co., has opened a consulting business at 866 Rockefeller building, Cleveland, as a productio nengineer, in order to continue on a larger scale the work he successfully conducted with the Spring company. Mr. Mainwaring was associated with the American Bridge Co., in the open-hearth department of the Pencoyd plant, during the installation of the continuous process of steel-making. He is familiar with the advantages of different alloys of steel for special uses and their heat treatment.

The Technical Equipment Co., East Lyme, Conn., manufacturer of steam gages, has filed a petition in bankruptcy.

METAL MARKETS

New York

Feb. 24.

Copper.—The undertone in the refined copper market has weakened almost from day to day during the week. While the leading producers still hold to their old asking price of 14.87½c, delivered 30 days, this figure is not at all representative of the market. Today, electrolytic can be quoted 14.50c, delivered 30 days. Some producers are soliciting European business at about this figure but little buying has resulted. Domestic buying is almost at a stand-still. Casting copper may now be quoted nominally at 14.37½c, delivered 30 days, for the usual brands. Good prime lake copper is held at 15c, cash, while Calumet & Hecla continues to hold its best product at 15.25c, cash. Some sales of slightly inferior grades of lake are heard of at 14.87½c, cash.

Tin.—The price of this metal continues to decline both in this and in the London market. Today, February and March are held at 38.62½c; April at 38.75c; May at 38.87½c and June at 39c. Some June and some March were sold today at the figures named. Demand is very poor.

Lead.—Consumers are showing no anxiety to purchase and producers are not exerting themselves to make sales. An advance in price is expected as soon as buying begins to develop in volume. The New York shipment price of the leading interest continues 4c, in 50-ton lots.

Spelter.—Demand continues dull but producers are not trying to press sales and the market is not weak. Prime western brands may be had at 5.40c to 5.45c for New York shipment in 50-ton lots.

Antimony.—This metal is very dull. New York quotations for large buying, duty paid, are as follows: Cookson's, 7.25c to 7.35c; Hallett's, 7c to 7.25c; United States, 7c to 7.12c; other brands, 5.87½c to 6.12½c.

Chicago

Feb. 23.

New Metals. — New metals have remained comparatively stationary the past week, copper making practically no change, spelter declining slightly and tin losing the advance made the previous week.

We quote dealers' selling prices f. o. b. Chicago as follows:

Lake copper, carload lots, 14¾c; casting, 14⅞c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 5.35c; lead, desilverized, 4.08c; sheet zinc, $7.25, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 39½c; Cookson's antimony, 7½c; other grades, 6½c.

Old Metals.—No changes of sufficient importance to warrant altering quotations has taken place in old metal prices in this market. Some offerings of scrap from the railroads have appeared but not of sufficient volume to affect the market. The Northern Pacific railroad offers 400 pounds of No. 1 copper, 200 pounds of No. 2 copper and 800 pounds of battery plates.

We quote dealers' selling prices f. o. b. Chicago as follows:

Copper wire, crucible shapes, 13¼c; copper bottoms, 11½c; heavy red brass, 11½c; heavy yellow brass, 8¾c; No. 1 red brass borings, 10½c; No. 1 yellow brass borings, 7¾c; brass clippings, 9c; lead pipe, 4c; zinc scrap, 3¾c; tea lead, 3½c; No. 1 aluminum, 12½c; No. 1 pewter, 24c; block tin pipe, 33½c; tin foil, 28½c; linotype dross, 3c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3c.

JOSEPH SELLWOOD

Long Prominent in the Lake Superior Region, Passes Away.

Joseph Sellwood died at his home in Duluth, on Tuesday, Feb. 24, of Bright's disease. He had been in rather poor health for the past two years, but his condition was not regarded as serious until about Christmas, last. Captain Sellwood was one of the pioneers of the northwest and a self-made man in every sense of the word.

He was born at Cornwall, England, Dec. 5, 1846, and for a time worked in the tin mines. He came to this country alone in August, 1865, and within two months thereafter went into the Lake Superior iron country, securing employment at the old Omega mine, now a part of the Maas mine in Ontonagon county, Michigan. He remained in the copper country until 1870, and then entered the employ of the New York Mining Co., operating at Ishpeming on the Marquette range. It was not long before he began contracting to mine ore by the ton, hiring his own men. Beginning with a part of the old New York mine his contracts grew until they embraced most of the mining at the New York and Cleveland mines, in which Samuel J. Tilden had a considerable interest. Notwithstanding his great activities in iron mining, he also found time to establish a general store at Ishpeming, which still operates under the name of Joseph Sellwood & Co.

When the Gogebic district began to be explored, Mather, Morse & Co. sent Sellwood to open the Colby mine. He also opened the Brotherton mine for Pickands, Mather & Co. on the Gogebic range. Mr. Sellwood had an inherent ability to mine at low cost and was among the first to see the advantage of the steam shovel proposition. Mr. Sellwood later organized the Brotherton Mining Co., in which he acquired a one-fourth interest, becoming president of the company. This ownership continued until the sale of the property to the Lackawanna Steel Co. Sellwood then obtained a lease on the Sunday Lake mine. In 1886 Mr. Sellwood went to Minnesota and opened the Chandler mine for the Chicago & Minnesota Ore Co., dividing his time between the Vermillion and Gogebic ranges. Captain Sellwood remained at the Chandler mine until April, 1892, when he went on to the Mesabi range to pick up properties for the Minnesota Iron Co., and as a result of his explorations the company bought the Norman, Fayal, Auburn, Genoa, Iron Chief, Moose, Canton and Cloquet mines, all of which are now held by the Steel Corporation.

In 1898, Mr. Sellwood left the Minnesota Iron Co. to look after the ore interests of the American Steel & Wire Co. In the interests of this company, he opened the Sauntry, Alpena, Clark and Chisholm mines on the Mesabi range, the Atlantic on the Gogebic range, the Moore on the Marquette range, and the Cuff mine on the Menominee. When the Steel Corporation was formed, Sellwood left the employ of the American Steel & Wire Co., in order to pick up properties for himself and independent interests, and was eminently successful. He gradually branched out into other lines of endeavor and was president of the City National Bank of Duluth, the First National Bank of Ely, the Bank of Two Harbors, as well as being the controlling factor in the First National Bank of Bessemer, Mich. During the latter part of his life he also went into vessel property, building the steamer Joe S. Morrow, naming the vessel after his young grandson. He leaves a widow, two daughters and a son, Mrs. Charles L. Mershon, Mrs. L. W. Leithhead, and Richard M. Sellwood.

JOSEPH SELLWOOD

Testing Society Meeting.—The annual meeting of the American Society for Testing Materials will be held at the Hotel Traymore, Atlantic City, on June 30 to July 4. Edgar Marburg, secretary, requests that manuscript be submitted to him no later than April 15 and as far in advance of that date as possible.

Stockholders of the Stanley Works, New Britain, Conn., have voted to adopt the recommendation of the directors that the capital stock of the corporation be increased from $2,000,000 to $2,500,000. The new stock will be apportioned to stockholders.

Vigorous Protests Filed by Industrial Railroads

Which Object to Ruling of Interstate Commerce Commission

First Application for Re-opening Comes From Subsidiaries of the United States Steel Corporation—Plea That Present Practice Should be Continued

Washington, Feb. 25. (By wire.)—The first of the applications for reopening of the industrial railways case to be brought before the Interstate Commerce Commission was by subsidiaries of the United States Steel Corporation, including the Union Railroad Co., the Newburgh & South Shore railway Co. and the Lake Terminal Railroad Co. Counsel for these lines, Charles Macveagh, J. H. Reed, C. A. Severance and Charles S. Belsterling, in a brief, will call the attention of the Commission to the voluntary action of the joint commission representing some of the so-called terminal roads of the Corporation and trunk lines, their object being to secure from the Commission instructions with regard to the propriety of continuing divisions and allowances which have been in existence for a long period. It is still the attitude of the joint committee that the determination of the Commission shall prevail unless otherwise ordered by the courts, but terminal lines are seeking to bring before the Commission certain phases of the matter which they feel should receive further consideration, and also wish to present facts not submitted at the former hearing.

Special objection is made to the commission's findings that rates on in-bound and out-bound products from steel industries on lines of the complainants do not include the cost of spotting and other transportation services by terminal roads, and objections also are made to the finding that the line carriers are not compensated for such services in the rates.

The complainants are prepared to show by competent evidence that the rates are not only relatively high enough to include the cost of the terminal road haul and related services, but they also have been understood by the carriers and the public to include all those services. It will be urged that the necessary effect of transferring the spotting and attendant services to a separate charge will be increased freight rates, which are not justified. This will result in discrimination and disturb a fair adjustment heretofore made by the line carriers. The present practice must continue, it will be held, to afford equality of opportunity to manufacturers, merchants and other depending on trunk line services. Attention will be called to the immense investment by the iron and steel industries in terminal roads and necessary adjuncts which otherwise would have had to be built by the line carriers, and also in this connection the increased facilities of commerce and free competition will be pointed out.

It will also be claimed that the commission should not have found the complainants' roads were plant facilities. The brief will cite the fact that the road haul, segregation, yarding and delivery service performed should be considered a part of the line haul services. Finally, it will be urged that the effect of the commission's report, if carried into practice, will be to unjustly and unlawfully impose on iron and steel industries the cost of operating and maintaining transportation terminal facilities which have been built by the complainants to aid the line carriers; such a procedure would cause the line carriers to discriminate againts industries on terminal tracks. It would also advance rates on particular commodities, disturb the whole rate situation, disturb the grouping of rates into territories and in fact rearrange the whole fabric of rates in this country, despite the fact no evidence that rates per se on particular commodities are unreasonably low or should be advanced. There is no evidence, it is contended, to justify the finding that these rates do not bear a proper relation to rates on other commodities.

Emphatic Protests Expected

Washington, Feb. 24.—It is learned from reliable sources that there will be an emphatic protest from industrial railways when the trunk lines cancel the tariffs making allowances to industrial lines reaching iron and steel plants, in accordance with the recent decision of the Interstate Commerce Commission in what is known as the Industrial Railway case.

These industrial railways, such as those in the Pittsburgh and other great iron and steel districts, many of which are incorporated, and have a number of miles of track, have been enjoying allowances, a part of through rates on the shipments of commodities in and out of steel plants, for a great many years.

The commission now says that all these allowances are unlawful because the service performed by the plant railroads is not to be classed as transportation service for which a railroad company may make an allowance out of a rate, but is merely a means of conducting the business of the steel plants. The question—and it is treated without the slightest attempt at levity—"When is a railroad a railroad and when is it not, and, if so, why?" is a great question now before the commission.

In the tap line cases, the commission permitted some industrial railroads to receive allowances and refused them to others. In the investigation with reference to the industrial railways in the Pittsburgh and other iron and steel districts, the commission stated that the allowances were not only discriminatory, but constituted a device for an old-fashioned rebate. This decision of the commission was rendered Jan. 20 of this year, but the whole case was submitted and the arguments made Feb. 28, 1913.

In view of this, there is cause to wonder whether the iron and steel trade particularly and the public generally know that since the industrial railways case was submitted to the commission the Supreme Court of the United States has had something very important to say on the subject of allowances to industrial railways. In the case of the Mitchell Coal & Coke Co., decided by the Supreme Court of the United States June 9, 1913, there was involved a suit for damages by a coal shipper because his competitors had been given allowances out of a rate for services supposed to be performed by a short railway running from the mine to the trunk line. In the course of deciding that case, the Supreme court held that a carrier may lawfully grant to shippers doing their own hauling a reasonable trackage or lateral allowance from the published tariff.

If it is perfectly lawful to make such allowance to lines running into a coal mine (and the Supreme court stated the matter broadly and made no distinction because of the peculiar

character of the service) it would seem decidedly difficult to see any distinction between such a railway and one that happens to run into a steel plant.

So it remains to be inquired whether the Interstate Commerce Commission has been overruled by the Supreme court of the United States.

BACKERT APPOINTED

Secretary-Treasurer of the American Foundrymen's Association.

A. O. Backert, editor of *The Foundry* and general manager of The Penton Publishing Co., has accepted the position of secretary-treasurer of the American Foundrymen's Association, which was tendered him shortly after the resignation of Dr. Richard Moldenke, on Jan. 17. Coming entirely unsolicited, Mr. Backert regarded the appointment by President Alfred E. Howell as a demand for service which could not be declined.

After preliminary training in general newspaper work in Cleveland, Mr. Backert entered trade journalism as Pittsburgh representative of THE IRON TRADE REVIEW and *The Foundry* 14 years ago, and during five years of his service in that city was chairman of the program committee of the Pittsburgh Foundrymen's Association and very active in its work. He has been editor of *The Foundry* for five years and recently was appointed general manager of The Penton Publishing Co.

Company Makes Good Showing

The Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has declared the regular semi-annual dividend of 4 per cent on the common stock, payable April 1 to stockholders of record March 15. The consolidated balance sheet of the company and its subsidiaries for the year ending Dec. 31, 1913, shows a very satisfactory condition. The reserves have been strengthened materially and the surplus increased by more than $100,000. Quick assets are more than seven times the current liabilities.

Appoints Sales Representatives

The Knox Pressed & Welded Steel Co., Pittsburgh, has appointed Wonham, Sanger & Bates, Inc., 30 Church street, New York City, sole eastern and foreign representatives for the sale of general plate work, including tanks of all descriptions, stacks, galvanizing pots, penstocks, stand pipes, bins, complete refineries and welded devices of all descriptions.

Westinghouse Veterans Organize

Employes of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., who have been in its employ for a period of 20 years or more, met Feb. 21 and organized the Veteran Employes' Association. Following the business meeting, an interesting program was carried out, consisting of speeches and vaudeville. The toastmaster was L. A. Osborne, vice president of the company.

About 325 employes of the Westinghouse company are eligible to membership, and 315 were present. The speakers were: E. M. Herr, president; Chas. A. Terry, vice president, and Jas. J. Barrett, representing the shop.

Mr. Herr, in the course of his remarks, promised the support of the company to the organization and also stated that the officials of the company were working on a pension plan for the employes, details of which would be announced later.

Will Handle Coke Sales

The Domhoff & Joyce Co., Cincinnati, has renewed its contract with the Citizens Gas Co., Indianapolis, for the exclusive sale of all of the by-product coke produced by that company at both of its Indianapolis plants. At the Prospect street plant, the Otto-Hoffman type of oven is used, while at the Langsdale avenue plant a new set of Solvay ovens has been installed and they were fired a few days ago. The combined capacity is 400,000 tons of coke annually, of which about 65 per cent will be foundry and metallurgical coke and about 35 per cent will be sold to coal dealers for domestic consumption.

A. O. BACKERT,
Who Has Accepted Secretaryship of American Foundrymen's Association

More Activity in Railroad Equipment

New Inquiries for Cars—Illinois Central Increases Its Rail Order

Broader activity in the railroad equipment market has featured the past week. New inquiries for cars, aggregating about 6,000, were issued in that period, the largest lot of which is 3,650 for the New York Central. Active car inquiries now pending reach about 10,000 cars. Car orders placed in the week under review reached about 2,000.

Not much car business is apparent in the western market. Inquiries by eastern roads, however, may result in some business being distributed to mills in that territory.

The Illinois Central railroad has increased its recently-reported rail order to a total of 67,000 tons. This road, as previously stated, last week placed 17,500 tons with the Tennessee Coal, Iron & Railroad Co., largely for the Central Railroad of Georgia. It now has increased this tonnage to 65,000 tons, the balance going to the Illinois Steel Co.

CARS AND LOCOMOTIVES.

The Central Railroad of Georgia is inquiring for 500 box cars.

The Southern Railroad has increased its recently reported inquiry to 2,750 cars. This inquiry now calls for 1,500 box, 500 flat, 200 caboose, 125 stock and 25 poultry cars.

The Southern Railroad has increased its recent locomotive inquiry to 41, divided into 15 mikados, five Pacifics, 15 switchers and six passenger type.

The Ray Consolidated Copper Co. has ordered 40 mine cars from the Pressed Steel Car Co.

The Atlantic Coast line is inquiring for 100 steel underframes.

The New York Central railroad is inquiring for 1,000 hoppers, 1,000 steel underframe box, 500 all-steel box, and 1,250 hopper cars.

The Florida & East Coast railway has placed 500 box cars with the Mt. Vernon Car Mfg. Co.

The Anaconda Copper Co. has ordered 150 ore cars of the Pressed Steel Car Co.

The Great Northern railroad has placed 30 steel passenger coaches with the Barney & Smith Car Co.

The Philadelphia & Reading railroad is in the market for 1,000 hopper cars.

The Lake Erie, Franklin & Clarion railroad is inquiring for 100 box cars.

Florida East Coast Railway, 500 box cars, steel underframes, to the Mt. Vernon Car Mfg. Co.

Northern Pacific Railway, 250 all steel ore cars, to the Western Steel Car & Foundry Co.

Atlantic Coast Line, 25 Pacific type locomotives to the Baldwin Locomotive Works.

Illinois Central Railway is inquiring for 50 mikado and 25 switching locomotives.

Atlantic Coast Line is in the market for six 70-foot coaches, 5-60-foot express cars and 4-70-foot combination mail and baggage cars.

The St. Louis & San Francisco or Cotton Belt railroad is inquiring for 1,000 to 1,500 box cars, 400 flat cars, and 100 gondolas.

The Virginia and South Western railroad has placed 400 gondola cars with the Pressed Steel Car Co. This order represents a part of the inquiry issued by the Southern railroad.

The Clinchfield Coal Corporation has ordered 300 mine cars from the Hockensmidth Car Co.

The Denver & Rio Grande railroad has withdrawn its recent inquiry for 1,000 to 1,500 cars.

STRUCTURAL AWARDS

Being Made Very Slowly—Heavy Tonnages Are Pending.

Inquiries are pending in the eastern market for at least 25,000 to 30,000 tons of steel for miscellaneous structural projects, not including probably 75,000 tons of subway and elevated work, which now is active. The largest single building project is the Widener building, Philadelphia, the steel for which it now is estimated will run 9,000 tons. Awards, however, have been dragging the past several weeks. The T. A. Gillespie Co., Snare & Triest and Terry & Tench now jointly are asking the mills to quote them on their third tracking contracts for the Second, Third and Ninth avenue elevated lines, New York City, the steel for which will run at least 50,000 tons.

Structural business in the west is characterized by small tonnages. Some larger enterprises are pending but have not yet reached the stage of awarding contracts. The design of the First National Bank building, at Paris, Texas, which called for about 400 tons of structural steel, has been changed to reinforced concrete. The Plankington Hotel, Milwaukee, has reached the stage of preliminary figures, about 6,000 tons involved.

STRUCTURAL CONTRACTS PLACED.

Office building for Delaware & Hudson railroad, Albany, N. Y., 500 tons, awarded to the John Eichleay Jr., Co., Pittsburgh.

Building for the General Chemical Co. at Marcus Hook, Pa., 250 tons, awarded to American Bridge Co.

Bell Telephone Co. building, Pittsburgh, 3,500 tons, general contract placed with the Geo. A. Fuller Co.

Goelet loft building, Nineteenth street, New York City, 900 tons, general contract placed with the R. H. Casey Co.

Store building, New Rochelle, N. Y., 600 tons, general contract placed with C. T. Wills.

Building for the Lauerentide Pulp & Paper Co., Grand Mere, Quebec, 1,200 tons, awarded Dominion Bridge Co.

Steel plates for dredge pipe, 1,000 tons, to be erected for St. Lawrence River Power Co., Massena, N. Y., by Riter-Conley Mfg. Co.

Ore bridge, C. H. & D. railroad, 570 tons, to the Wellman, Seaver, Morgan Co.

State Normal School, Cheney, Wash., 147 tons, to Minneapolis Steel & Machinery Co.

Christian Church Hospital, Kansas City, Mo., 148 tons.

Bonfils building, Kansas City, Mo., 307 tons to Kansas City Structural Steel Co.

Receivers of the Frisco R. R., car repair material, 110 tons.

Argentine Wagon Bridge, Kansas City, Mo., 375 tons to Kansas City Bridge Co.

Humboldt County, Cal., 3-250-foot spans across the Eel river, 211 tons, to American Bridge Co.

The Palace Theater, Minneapolis, Minn., 500 tons to the Minneapolis Steel & Machinery Co.

Binghampton High School, Binghampton, N. Y., about 850 tons of steel, fabricating and steel to G. H. Merrill & Co., Binghampton.

STRUCTURAL CONTRACTS PENDING.

Johnson-Kahn loft building, Twenty-seventh street and Fifth avenue, New York City, 4,000 tons, bids taken.

High School of Commerce, Boston, 800 tons, inquiry issued.

Strauss bascule bridge, Buffalo, for Delaware, Lackawanna & Western railroad, 500 tons, inquiry issued.

Mercantile building, Boston, 700 tons, inquiry issued.

Bridge work for New York Central railroad, aggregating about 2,000 tons, and including 600 tons for two transfer bridges at Weehawken, N. J., bids pending.

Garage for the West End Brewing Co., Utica, N. Y., 250 tons, bids pending.

Theater, New Haven, 200 tons, bids pending.

Section No. 4, Seventh avenue subway, New York City, bids to be received March 2, now estimated to require 5,200 tons.

Section 6A of the Seventh avenue subway, New York City, bids to be received March 12. Steel tonnage not yet estimated.

Apartment for Astor Estate on Broadway, between Eightyninth and Ninetieth streets, New York City, 2,500 tons, bids asked.

Building for the Fulton Bag & Paper Co., Brooklyn, 1,500 tons.

Bridge work for New York, New Haven & Hartford railroad at Woodlawn Junction, N. Y., 250 tons, inquiry issued.

Widener building, Philadelphia, revised estimates make steel requirements about 9,000 tons.

Addition to Munsey building, Washington, D. C., 1,200 tons. Bids being taken.

Coal barges for government 1,000 to 1,200 tons. Bids taken this week.

Foundation Lincoln Memorial, 489 tons plates, to be awarded this week.

Muehlebach Hotel, Kansas City, Mo., 2,000 tons, bids being taken.

Great Northern & Northern Pacific building, St. Paul, 7,000 to 8,000 tons, bids received.

Bridge across Mississippi river at Memphis, Tenn., 20,000 tons to 23,000 tons, bids taken until Feb. 28.

Esenwein & Johnson, architects, Buffalo, completed plans for erection of hotel at Hamilton, Ont., for the Canadian Parkers, Ltd., taking about 1,200 tons of steel.

Steel Companies Lose Fight on Coal Rate

Which is Declared Not Unreasonable by Interstate Commerce Commission—Admitted to be a Close Question

Washington, Feb. 24.—The rate of 70 cents per net ton on coal from the Pittsburgh district to the Mahoning and Shenango valleys of Ohio and Pennsylvania, respectively, is not unreasonable or unjustly discriminatory, according to an opinion of the Interstate Commerce Commission, decided Feb. 3, and handed down last Saturday. The rate to the Shenango valley being intrastate, the Commission has no jurisdiction, but no doubt it will be maintained.

This makes the second decision rendered by the Commission in a series of attacks by 18 independent steel manufacturers of the valleys against rates on pig iron making materials. In the first decision, that pertaining to the Connellsville coke rate, the protestants were successful in getting the rate reduced from $1.35 to $1.20 per ton. The rate of 56 cents from lower Lake Erie ports is pending decision. All the complaints were filed in November, 1911.

Attack on the limestone rate of 35 cents per ton from Carbon, Pa., is to be made, although this rate, as well as those applying to coal, coke and ore, is scheduled for an advance in the eastern railroads' so-called 5 per cent case, despite the fact that in the coke case the Commission entered an order that the new rates were to remain in effect two years from Aug. 1, 1913.

By the proposed tariffs in the eastern advance case, the limestone rate is 40 cents, an increase of a little more than 14 per cent, the coke rate $1.26, an increase of 5 per cent, and the ore rate 61 cents, an increase of about 9 per cent.

The coal case was entitled the Youngstown Sheet & Tube Co., et al., vs. the Pittsburgh & Lake Erie Railroad Co. Participating lines intervened. The decision was written by Chairman E. E. Clark. Mills and furnaces of the complainants are located at Lowellville, Struthers, Youngstown, Girard, Niles, and Hubbard, O., and at Sharon and Sharpsville, Pa. The annual coal-consuming capacity of the valleys is approximated at 6,000,000 tons, and that of the complainants about 1,764,000 tons.

The railroads contended that a rate which has remained stationary for 10 years, as the 70 cent rate did, is relatively lower today than it was 10 years ago, in so far as its earning power for the railroad is concerned. That is, although the gross income has increased, the operating, maintenance, and fixed charges, taxes and similar expenses have outstripped the revenue increase, and the net income decreased.

"Many of the facts and arguments which complainants submit as reasons for the reduction in the challenged rate," the decision reads, "bear a double aspect. For instance, the rate was lower 10 years ago (it was 60 cents then), but the present rate has been maintained for the last 10 years. The statement previously given (showing rates from the Pittsburgh and adjacent coal districts to various points of destination), applicable from various districts, shows but one rate which for equal or shorter distances produces a less revenue per ton-mile than does the Youngstown rate." Apparently, reference in this connection is made to rate from the Cambridge coal district of Ohio to Alliance, which is 60 cents, the distance 94 miles, and the ton-mile earnings 6.38c. The average distance from the Pittsburgh district to the valleys is given as 99.3 miles, and the ton-mile earnings 7.05c.

Rates per ton mile by the lines of the principal defendants are declared to be graded quite closely to the rates from the Pittsburgh and adjacent coal districts to various points of destination.

The following is one of several interesting paragraphs in the coal rate decision:

"We have stated as briefly as possible the essential facts of record on which the parties rely. Minor details which we have considered are not outlined here. Complainants demand a reasonable and non-discriminatory rate which, apparently, on the basis of the previous differential of 13 cents under the lake cargo rate from the Pittsburgh district to the lower lake ports, would make the rate to the valleys 65 cents. To determine from the facts before us whether or not a reduction of 5 cents shall be made is a close question. In fact, after a careful review of a somewhat voluminous record and consideration of the briefs and arguments which have been filed and made, this case seems to be one of those which, in the words of the Chief Justice of the Supreme Court of the United States, is within the 'flexible limit of judgment which belongs to the power to fix rates'. Atlantic Coast Line v. N. Car. Corp. Comn., 206 U. S., 1, 26."

SLIGHT INCREASE

In Pig Iron Stocks in the Middlesbrough District.

Pig iron stocks in the Middlesbrough district in England increased 1,681 tons in the week ended Feb. 12, to a total of 136,023 tons. Stocks on that date, however, were 2,641 tons less than on the first of the year. Cumberland stocks remain unchanged at 8,414, which is 544 tons below the total of Jan. 1, 1913. In the Middlesbrough district, 75 furnaces were blowing the week of Feb. 12, compared with 75 the preceding week and 89 on the corresponding week a year ago. There also is no change in the Cumberland and Scotland districts, the active stacks remaining 23 and 66 respectively. These figures compare with 26 and 92 furnaces on corresponding dates in 1913. A statement of the stocks on hand and furnaces blowing since the first of the year, is as follows:

MIDDLESBROUGH DISTRICT.

		Stocks.	Furnaces.
Feb.	12	136,023	75
Feb.	5	134,342	75
Jan.	29	134,918	76
Jan.	22	132,319	77
Jan.	15	133,972	77
Jan.	8	134,738	74
Jan.	1	138,664	74
Jan.	1, 1913	241,623	..

CUMBERLAND DISTRICT.

Feb.	12	8,414	23
Feb.	5	8,414	23
Jan.	29	8,414	23
Jan.	22	8,424	20
Jan.	15	8,617	19
Jan.	8	8,617	19
Jan.	1	8,958	23
Jan.	1, 1913	36,423	..

Coke Required

The problem of smoke elimination on the railroads in Pittsburgh was again raised last week when an ordinance was introduced in council requiring the Pennsylvania Railroad Co. to burn coke on all engines within the city limits west of Union station. The ordinance does not affect main line traffic running east out of the central terminal, but only that running west through the Northside, or old Allegheny. Fuel bills would be increased about $3,000 a week, or about $150,000 a year, according to estimates.

IRON AND STEEL PRICES

Pig Iron

PITTSBURGH

(Through First Half 1914.)

Bessemer,	$15.15
Basic	14.15
No. 2 foundry	14.15 to 14.40
Malleable	14.15 to 14.40
Gray forge	13.65 to 13.90

(The freight from valley points is 90c.)

CLEVELAND

(Through First Half 1914, Delivered in City.)

No. 1 foundry	$14.50 to 1475
No. 2 foundry	14.00 to 14.25
No. 2 southern	15.00 to 15.35
Bessemer	15.15
Silveries	17.30 to 17.55

CINCINNATI

(Prompt and First Half.)

Southern foundry No. 1	$14.25 to 14.75
Southern foundry No. 2	13.75 to 14.25
Southern foundry No. 3	13.25 to 13.75
Southern foundry No. 4	13.00 to 13.50
Southern gray forge	12.75 to 13.25
Mottled	12.75 to 13.00
Southern No. 1 soft	14.50 to 15.00
Southern No. 2 soft	14.00 to 14.50
Southern Ohio No. 2	14.20 to 14.70
Southern Ohio No. 3	13.70 to 14.20
Southern Ohio No. 4	13.45 to 13.95
Silveries, 8 per cent silicon	17.20 to 17.70

(Freight from Ironton, $1.20; from Birmingham, $3.25.)

CHICAGO

(Delivered Chicago, until July 1, 1914, except northern foundry, and malleable Bessemer, which are quoted f. o. b. local furnace.)

Lake Superior char., No. 1 to 4	$15.50
Northern foundry No. 2	14.00 to 14.25
Southern foundry No. 2	14.85
Jackson Co. silveries, 8 per cent	18.40
South'n silveries, 5 per cent sil.	16.85
Alabama basic	14.85
Malleable	14.00 to 14.25

PHILADELPHIA

(Prompt and first half delivery, prices based consumers' plants in Philadelphia and vicinity unless otherwise specified.)

Northern No. 1X foundry	$15.25 to 15.50
Northern No. 2X foundry	14.85 to 15.25
Northern No. 2 plain	14.50 to 14.75
Standard forge (Eastern Pa.)	14.00 to 14.25
Virginia No. 2X	15.55 to 15.80
Southern No. 2	14.75 to 15.00
Standard low phos., Phila.	21.00 to 21.25
Lebanon low phos., furnace	17.00 to 17.50
Malleable	15.25 to 15.50
Basic (Eastern and Central Pa.)	14.25 to 14.50
Middlesbrough, English No. 3 (on dock)	15.00 to 15.25

NEW YORK

(Prompt and first half delivery, prices based at Jersey City, at Newark, and at Jersey points near tidewater.)

Northern No. 1X foundry	$15.25 to 15.50
Northern No. 2X foundry	14.75 to 15.25
Northern No. 2 plain	14.50 to 14.75
Virginia No. 2X	15.85 to 16.10
Southern No. 2	14.75 to 15.25
Malleable	14.75 to 15.00
Gray forge	14.00 to 14.25

ST. LOUIS

(Throughout This Year.)

Southern No. 1	$15.00 to 15.50
Southern No. 2	14.50 to 15.00
Southern No. 3	14.00 to 14.50
Southern No. 4	13.75 to 14.00

(Freight, Birmingham to St. Louis, $3.75).

BIRMINGHAM

(For southern delivery.)

No. 1 foundry	$11.50 to 12.00
No. 2 foundry	11.00 to 11.50
No. 3 foundry	10.50 to 11.00
No. 4 foundry	10.25 to 10.75
Gray forge	10.25 to 10.75
Mottled	10.25
Standard basic	10.75 to 11.25
Basic	11.00 to 11.50
Off basic	10.50 to 11.00
Charcoal	25.00

BUFFALO

(Delivered in city first and second quarters.)

No. 1 foundry	$13.25 to 13.50
No. 2X foundry	13.00 to 13.25
No. 2 plain	13.00
No. 3 foundry	12.75 to 13.00
Gray forge	12.75 to 13.00
Malleable	13.00 to 13.50
Basic	13.50 to 14.00
Charcoal	15.50 to 16.50

Ferro Alloys

English and German 80 per cent ferro manganese, prompt and forward delivery, $39 to $40, seaboard.

Fifty per cent ferro-silicon, $73, Pittsburgh, or Philadelphia, for carloads; $72 for larger lots, and $71 for 600 tons or more. Twelve to 13 per cent, $21. Eleven to 12 per cent, $20. Ten to 11 per cent, $19. Nine to 10 per cent, $18, f. o. b. Globe, Jisco, and Ashland furnaces. Freight to Pittsburgh, $1.90.

Ferro-carbon titanium, 8 cents per pound for carload lots; 10 cents per pound for 2,000-pound lots and over; 12½ cents per pound in lots up to 2,000 pounds.

Freight rates on ferro-manganese, foreign spiegeleisen and electrolytic ferro-silicon from Baltimore to Pittsburgh, $2.16; to Youngstown, $2.48; to Cleveland, $2.57; to Detroit and Columbus, $2.99; to Cincinnati, $3.40; to Chicago and Milwaukee, $4. Freights from Philadelphia and New York, 10 to 30 cents higher, respectively.

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds, to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11 cents
Cleveland	10 cents
Cincinnati	15 cents
Chicago	18 cents
Denver	84½ cents
St. Louis	22½ cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, plates and shapes	80 cents

Coke

AT THE OVENS.

Connellsville district:	Prompt shipment.	Contract.
Foundry coke	$2.40 to 2.65	$2.50 to 2.75
Furnace coke	1.85 to 2.00	2.00 to 2.10
Wise county district:—		
Foundry coke	$2.50 to 3.10	$2.65 to 3.10
Furnace coke	2.00 to 2.10	2.10 to 2.25
Pocahontas district:—		
Foundry coke	$2.50 to 2.75	$2.50 to 2.75
Furnace coke	2.15 to 2.40	2.25 to 2.60
New River district:—		
Foundry coke	$2.85 to 3.50	$2.85 to 3.50
Furnace coke	2.50 to 2.75	2.50 to 2.75

Iron Ore

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer prices are: Old range Bessemer, $4.40; Mesabi Bessemer, $4.15; old range non-Bessemer, $3.60; Mesabi non-Bessemer, $3.40; all at lower lake ports.

Foreign Bessemer and non-Bessemer ores, ranging from 50 to 65 per cent in metallic iron content, 7 to 8 cents per unit, f. o. b. cars eatsern seaboard, depending on quality. Freight rates from Philadelphia to eastern Pennsylvania furnace points range from 35 to 75 per cents per ton.

Semi-Finished Material

PITTSBURGH

Bessemer 4 x 4 billets with 0.25 carbon and less, $21; open-hearth rolling billets, $21; Bessemer sheet bars, $22; open-hearth sheet bars, $22, f. o. b. maker's mill, Pittsburgh and Youngstown. Forging billets $24 to $25, Pittsburgh. Wire rods, $26.00 to $26.50; muck bar, $28.00 to $28.50, Pittsburgh.

PHILADELPHIA

Delivered to consumers' plants in Philadelphia and vicinity; 4 and 4-inch open-hearth Bessemer, rolling billets at $23.40 to $24.40; and forging billets from $27.40 to $28.40; muck bar, $26.00 to $28.00.

Standard Shapes

PITTSBURGH

Standard structural shapes, 1.20c to 1.25c. For extras, see card of Sept. 1, 1909.

CHICAGO

Standard structural shapes, 15 inch and under, 1.43c.

PHILADELPHIA

Standard structural shapes, base sizes, delivered to consumers' plants in Philadelphia and vicinity, 1.30c to 1.40c.

NEW YORK

Standard structural shapes, base sizes, delivered in metropolitan district, 1.36c to 1.41c.

Plates

PITTSBURGH

Standard steel plates ¼ inch thick, 6¾ to 100 inches, 1.20c to 1.25c. For extras see card of Sept. 1, 1909.

CHICAGO

Tank plates, 1¼ inches thick, 6⅝ to 100 inches wide, 1.38c to 1.43c.

PHILADELPHIA

Tank plates, base size, delivered to consumers' plants in Philadelphia and vicinity, 1.30c to 1.40c.

NEW YORK

Tank plates, base sizes, delivered in the metropolitan district, 1.31c to 1.41c.

Sheets and Tin Plate

PITTSBURGH

No. 28 black	1.95c to 2.00c
No. 28 tin mill black	1.90c to 1.95c
No. 28 galvanized	2.95c to 3.00c
No. 10 blue annealed	1.40c to 1.45c
No. 28 painted corrugated	2.15c to 2.20c
No. 28 galvanized, corrugated	3.05c to 3.10c
Tin plate, 100-pound cokes	$3.40

PHILADELPHIA

Delivered to consumers' plants in Philadelphia and vicinity: No. 10 gage blue annealed sheets at 1.60c to 1.65c.

Pipe and Boiler Tubes

PITTSBURGH

	Black-Galv. Butt-Weld.	
Steel, ⅜ to 3 inches	79½	71
Iron, ⅜ to 2½ inches	70	61
	Lap-Weld.	
Steel, 2½ to 6 inches	79	70½

BOILER TUBES

Steel, 3½ to 4½ inches	71	..
Iron, 3½ to 4½ inches	60	..

Other sizes of pipe and tubes take the usual advances as per official card.

Rails and Track Material

PITTSBURGH

Steel rails, 50-pound and heavier, 1.25c per pound for Bessemer and 1.35c for open-hearth carload lots; less than 500 tons, 1.35c per pound; light rails on base weight of 40 to 45 pounds, 1.25c, schedule on the other weights being irregular and subject to negotiations; angle bars for standard sections, 1.15c, base, Pittsburgh; track bolts, 2.00c base, Pittsburgh.

Railroad spikes, 4½, 5 and 5½ and 9-16 inch, 1.45c to 1.50c.

CHICAGO

Light rails, carloads, 25 to 45-pound, 1.25c, base; 16 to 20-pound, 1.30c; 12-pound, 1.35c; 8-pound, 1.40c.

Light section relayers, 45 pounds and under, subject to inspection, $21.50 to $22.50; standard section relaying rails, subject to inspection, $23 to $24.

Track fastenings, f. o. b. Chicago:

Angle bars, 1.50c; railroad spikes, 1.55c; smaller sizes, spikes, 1.75c base; track bolts with square nuts, 2.00c to 2.05c.

Bars, Hoops and Bands

PITTSBURGH

Common iron bars, 1.30c to 1.35c, Pittsburgh; Bessemer and open-hearth steel bars, 1.20c to 1.25c; plow and cultivator, 1.20c to 1.25c; channels, angles, zees, tees, under 3 inch, 1.30c to 1.35c, all f. o. b. mill.

Hoops in carload lots, 1.30c to 1.35c, Pittsburgh; in less than carload lots, 1.45c to 1.50c; bands, 1.20c to 1.25c base, with net extras as per standard steel.

Cold rolled and ground shafting, 63 to 65 per cent off in carloads and 58 to 60 per cent in less than carloads delivered in base territory.

CHICAGO

Bar iron, 1.20c; hard steel bars, rerolled, 1.30c; soft steel bars, bands and small shapes, 1.38c to 1.43c; hoops, 1.48c; smooth finished machinery steel, 1 inch and larger, 1.68c; shafting, 63 to 65 per cent off list for carload lots, 60 per cent off for less than carloads.

PHILADELPHIA

Delivered in consumers' plants in Philadelphia and vicinity: Steel bars, 1.35c to 1.40c on contract, and common bar iron, 1.22½c to 1.32½c. Cut nails, 1.80c to 1.90c, Philadelphia. Shafting, 64 to 65 off in carloads and 62 to 63 off in less than carloads in base territory.

NEW YORK

Soft steel bars, delivered in the metropolitan district, 1.36c to 1.41c; common iron bars, 1.25c to 1.30c.

Bolts, Nuts and Rivets

Rivets

Button head structural rivets, 1.60c to 1.65c, Pittsburgh; cone head boiler rivets, 1.70c to 1.75c. Smaller rivets, 80 and 10.

Structural rivets, Chicago, 1.78c; boiler rivets, 0.10c extra.

Bolt and Nut Discounts

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller and shorter, rolled threads, 80 and 2½; cut threads, 75 and 17½; larger and longer, 70 and 15.

Machine bolts and hot pressed nuts ⅜ x 4 inches, smaller and shorter, rolled, 80 and 7½; cut, 80 and 2½; larger and longer, 70, 10 and 10.

Gimlet and cone point lag or coach screws, 80 and 20.

Hot pressed square, blank and tapped nuts, $6.00 off list; hot pressed hexagon blank or tapped, $6.70.

Cold pressed, C. & T. square, blank, or tapped, $3.80 off; hexagon, blank or tapped, ⅝ inch and larger, $6.80; ½-inch and smaller, $7.40.

Wire Products

PITTSBURGH

Wire nails, jobbers' carload lots, $1.60; retailers' carload lots, $1.65; cut nails (western makers) jobbers' lots, $1.60; painted barb wire, jobbers' carload lots, $1.60; retailers' carload lots, $1.65; plain wire to jobbers in carloads, $1.40; and to dealers in carloads, $1.45; polished staples, $1.60; galvanized staples, $2.00.

CHICAGO

Wire nails, jobbers' carload lots, $1.78; retailers' carload lots, $1.83; retailers' less than carload lots, $1.88; painted barb wire, jobbers' carload lots, $1.78; retailers' carload lots, $1.83; retailers' less than carload lots, $1.88, with 40c for galvanizing; plain wire, jobbers' carload lots, $1.58; retailers' carload lots, $1.63.

Cast Iron Pipe

CHICAGO

Four-inch water pipe, $26; 6 to 12 inches, $24; larger sizes, $23.50; gas pipe, $1 a ton higher.

NEW YORK

Six-inch, 30 pounds to the foot, $22 to $23, f. o. b. New York, in carload lots.

BIRMINGHAM

Water main, 4-inch, $22.50; 6-inch and up, $19.50. Gas main: $1 per ton higher than water main. Special fittings, $47.50 to $52.50.

Old Material

PITTSBURGH

(Gross Tons Delivered.)

Heavy melting scrap	$12.25 to 12.50
Rerolling rails	13.50 to 14.00
Malleable	10.75 to 11.25
Bundled sheet scrap	8.50 to 8.75
Iron axles	23.00 to 23.50
Old iron rails	11.30 to 14.00
Stove plate	9.50 to 9.75
No. 1 wrought scrap	12.75 to 13.00
Old car wheels	12.75 to 13.25
Low phosphorus	15.00 to 15.50
Machine shop turnings	8.25 to 8.50
No. 1 busheling	10.75 to 11.00
Cast borings	8.75 to 9.25
No. 1 cast scrap	12.50 to 12.75

PHILADELPHIA

Gross tons delivered to consumers' plants, in eastern Pennsylvania and western New Jersey:

Old iron rails	$16.00 to 17.00
Old steel rails (rerolling)	13.50 to 14.00
No. 1 heavy melting steel	11.50 to 12.00
Old car wheels	13.00 to 13.50
Old iron axles (nominal)	22.00 to 23.00
Old steel axles	17.00 to 17.50
No. 1 railroad wrought	15.00 to 15.50
Wrought pipe	11.00 to 11.50
Cast borings	9.25 to 9.75
Machine shop turnings	9.00 to 9.50
Heavy cast (broken)	13.00 to 13.50
Malleable	10.00 to 10.50
Stove plate	10.50 to 11.00
No. 1 forge	9.00 to 9.50
Low phosphorus	16.00 to 16.50

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg, and Steelton, Pa.; $1.40 to Milton, Pa.

CLEVELAND

Gross Tons

Old iron rails	$13.00 to 13.50
Old steel rails (under 3 ft.)	13.50 to 14.00
Old steel rails (over 6 ft.)	13.00 to 13.50
Relaying rails	23.00 to 25.00
Old steel boiler plate	9.50 to 10.00
Malleable iron (railroad)	11.00 to 11.50
Axle turnings	7.75 to 8.00
Malleable iron (agricultural)	9.00 to 9.50
Steel axles	15.75 to 16.00
Heavy steel	10.75 to 11.50
Country mixed steel	9.00 to 9.25
Bundled sheet scrap	7.50 to 8.00

Net Tons

No. 1 R. R. wrought	$11.00 to 11.50
No. 1 busheling (new)	9.50 to 10.00
No. 1 busheling (old)	9.00 to 9.50
No. 1 machine cast	11.00 to 11.50
No. 1 dealers' wrought	9.00 to 9.50
Machine shop turnings	6.00 to 6.25
Pipes and flues	8.50 to 9.00
Cast borings	6.50 to 7.00
Stove plate	8.50 to 9.00
Wrought iron arch bars (nom.)	13.00
Wrought iron piling plate	13.00

CHICAGO

(Delivered in consumers' yards.)

Gross Tons

Old car wheels	$11.75 to 12.25
Rerolling rails (5 ft. and over)	11.25 to 11.75
Old steel rails (3 ft. and und.)	10.50 to 11.00
Frogs, switches and guards	9.75 to 10.25
Heavy melting steel	10.00 to 10.50
Shoveling steel	9.00 to 9.50

Net Tons

No. 1 R. R. wrought	$ 9.25 to 9.75
No. 2 R. R. wrought	8.75 to 9.25
Arch bars and transoms	12.50 to 13.00
Knuckles, couplers and springs	9.00 to 9.50
Shafting	11.50 to 12.00
Iron car axles	17.50 to 18.00
Steel car axles	12.25 to 12.75
Locomotive tires	10.00 to 10.50
Cut forge	8.75 to 9.25
Pipe and flues	7.00 to 7.50
No. 1 cast	10.00 to 10.50
No. 1 busheling	8.00 to 8.50
No. 2 busheling	6.25 to 6.75
No. 1 boiler cut	7.25 to 7.75
Boiler punchings	9.75 to 10.25
Cast borings	5.00 to 5.50
Machine shop turnings	5.25 to 5.75
Agricultural malleable	8.50 to 9.00
Railroad malleable	9.75 to 10.25
Angle bars, splices, etc., iron	12.00 to 12.50
Angle bars, steel	8.75 to 9.25
Stove plate and light cast scrap	9.50 to 10.00

NEW YORK

Gross tons, New York dealers' prices at tidewater, usually for eastern Pennsylvania delivery:

Old car wheels (Jersey points)	$12.00 to 12.50
Heavy steel axles	14.00 to 14.50
Steel shafting	13.00 to 13.50
No. 1 heavy melting steel	9.00 to 9.25
No. 1 R. R. wrought	12.00 to 12.50
Wrought pipe (not galvanized)	8.50 to 9.00
Clean cast borings	6.50 to 7.00
Machine shop turnings (nom.)	6.50 to 7.00
Heavy turnings	6.50 to 7.00
Heavy cast (Jersey points)	12.50 to 12.75

Stove plate	$ 8.00 to 8.25
Grate bars	7.00 to 7.50

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City, and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City, and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City, and $1.60 from New York; to Roebling, N. J., $1.10 from Jersey City, and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York; to Jersey City, $1.00 from New York; to Newark, N. J., $1.10 from New York.

CINCINNATI

Gross Tons

Old iron rails	$11.00 to 11.50
Old steel rerolling	10.25 to 10.75
Old iron axles	16.00 to 16.50
Heavy melting scrap	9.25 to 9.75
Relaying rails	19.25 to 19.75

Net Tons

Old No. 1 R. R. wrought	$ 8.75 to 9.25
Bundled sheet scrap	5.00 to 5.50
No. 1 yard wrought	7.00 to 7.50
No. 1 machine cast	10.25 to 10.75
No. 1 busheling	6.50 to 7.00
Stove plate	7.25 to 7.75
Machine shop turnings	4.75 to 5.25
Cast borings	4.75 to 5.25
Heavy turnings	5.50 to 6.00
Mixed cast	8.00 to 8.50
Breakage	5.75 to 6.25
Malleable	7.00 to 7.50

BIRMINGHAM

Old iron axles (light)	$15.00 to 15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 R. R. wrought	12.00 to 12.50
No. 2 R. R. wrought	10.00 to 10.50
No. 1 country wrought	10.00 to 10.50
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Standard car wheels	12.00 to 12.50
Tram car wheels	10.50 to 11.00
Light cast and stove plate	8.00 to 8.25

BUFFALO

Gross Tons

Heavy melting steel	$10.50 to 11.00
No. 1 R. R. and mch. cast scrap	12.00 to 12.50
No. 1 R. R. wrought scrap	12.00 to 12.50
Old steel axles	17.00 to 17.50
Old iron axles	22.50 to 23.00
Car wheels	12.00 to 12.50
Railroad malleable scrap	10.75 to 11.25
Machine turnings	6.50 to 7.00
Heavy axle turnings	8.25 to 9.00
Cast iron borings	6.75 to 7.25
Low phos. steel scrap	15.00 to 16.25
Old iron rails	15.00 to 15.50
Boiler plate sheared	11.50 to 12.00
Bundled sheet scrap	6.25 to 6.75
Stove plate (net ton)	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
No. 1 busheling scrap	9.50 to 10.00
No. 2 busheling scrap	7.00 to 7.50
Wrought pipe	8.50 to 9.00
Bundled tin scrap	12.00

ST. LOUIS

(Dealers' buying prices.)

Gross Tons

Old car wheels	$11.25 to 11.75
Old iron rails	12.00 to 12.25
Re-rolling rails (5 ft. and over)	12.00 to 12.50
Old steel rails (3 ft. and und.)	11.25 to 11.50
Light sec. relayers (45 pounds and und.) subject to inspec.	23.00 to 23.50
Relaying rails, subject to inspec.	23.00 to 23.50
Frogs, switches and guards (cut apart)	11.00 to 11.50
Shoveling steel	9.00 to 9.50

Net Tons

No. 1 railroad wrought	$ 9.00 to 9.50
No. 2 railroad wrought	8.50 to 9.00
Arch bars and transoms	12.00 to 12.50
Knuckles, couplers, springs	9.50 to 12.00
Shafting	13.00 to 13.50
Steel car axles	13.00 to 13.50
Iron car axles	18.00 to 18.50
Locomotive tires	10.00 to 10.50
Pipe and flues	6.50 to 7.00
Tank iron and cut boilers	6.50 to 7.00
No. 1 cut busheling	8.00 to 8.50
Cast iron borings	4.50 to 5.00
Machine shop turnings	5.00 to 5.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	8.50 to 9.00
Stove plates	$ 8.00 to 8.50
Angle splice bars (iron)	10.50 to 11.00
Angle splice bars (steel)	9.50 to 10.00
Cast iron	10.50 to 11.00

Store Prices

CINCINNATI

Steel bars, 1.75c to 1.90c; iron bars, 1.70c to 1.80c; plates and shapes, 1.85c to 2c; sheets, blue annealed, No. 10, 2c to 2.05c; black, No. 28, 2.50c to 2.55c; galvanized, No. 28, 3.50c to 3.55c; cold rolled shafting, round, square, hexagon and flat, 55 to 58 off.

CLEVELAND

Steel bars, 1.80c; plates and shapes, 1.90c; iron bars, 1.85c; sheets, No. 10 blue annealed, 2.15c; No. 28 black, 2.60c; No. 28 galvanized, 3.60c.

CHICAGO

Steel bars, 1.65c; iron bars, 1.65c; hoops, 2.15c; shapes and plates, 1.75c; No. 10 blue annealed sheets, 1.95c; black, No. 28, 2.55c; galvanized, No. 28, 3.60c.

PHILADELPHIA

Steel bars, 1.80c; structural shapes, 1.80c; plates, 1.80c; iron bars, 1.70c.

NEW YORK

Steel bars, 1.90c; structural shapes, 1.95c; plates, 1.95c.

THREE FURNACES

Being Added to Active Carnegie List —Some Higher Prices.

New York, Feb. 25. (By wire.)—New business and operations with the United States Steel Corporation continue to make a favorable showing. Ingot operations increased this week to 82 per cent, and three Carnegie blast furnaces are being put on, which will bring the total active list to 82 out of 119. Idle furnaces include a number of the small class which are operated only in highly prosperous times. Since the first of the year the Corporation has absorbed about 200,000 tons of iron from stock. This heavy reduction is now responsible for more active furnace operations.

The Corporation announces it is now quoting 1.25c, Pittsburgh, on plates, shapes and bars for current business and 1.30c for second quarter.

C. L. Miller, vice president and general superintendent of the American Steel & Wire Co., Pittsburgh, accompanied by Mrs. Miller, sailed from New York for Naples, Feb. 24, on a four months' vacation through Europe.

NEW WAREHOUSE

Will be Built by Carnegie Steel Co. in Boston Suburb.

New York, Feb. 25. (By wire.)—After prolonged negotiations, the Carnegie Steel Co. has just obtained a site in Brighton suburbs, Boston, and will establish a warehouse to render improved distribution service to New England. About $350,000 will be expended on the new plant, appropriations for which were made some months ago.

Samuel Scott McKenney died Feb. 17 at the home of a son in Pittsburgh, where he had been in the iron and steel business for almost half a century. He was 67 years old. Mr. McKenney's father, William McKenney, was a pioneer scrap iron dealer in Pittsburgh.

The strike at the pdddling mill of A. M. Byers Co., Pittsburgh, at Girard, O., which was called July 1 last, has been called off, and former employes have returned to work.

LARGE TONNAGE

For Elevated Lines Will Probably Go to Bridge Company.

New York, Feb. 25. (By wire.)—The American Bridge Co., it is reported, will obtain 50,000 tons or more from general contractors for the third tracking of the Second, Third and Ninth avenue elevated lines, this city, though positive announcement has not yet been made to this effect.

Structural lettings of the past week were about 36,000.

The White store, Columbus, 2,000 tons, has gone to the Case Engineering Co. A theater at Minneapolis, 800 tons, has been awarded to the Minneapolis Steel & Machinery Co. The large Memphis bridge is still pending.

The Lincoln Memorial

Washington, Feb. 25. (By wire.)—The general contract for the Lincoln Memorial foundation has been let to the M. F. Comer Co., Toledo, and the steel award is expected to be made soon. The steel consists of about 600 tons for caissons and 250 tons of reinforcing bars and other structurals.

Nearing the End of Corporation Suit Hearings

Probable That Record Will Be Completed by April 1—Then Will Come the Long Battle in the Courts—Donner on Stand

The attorneys in the United States Steel Corporation dissolution suit have now come to the last lap in the taking of testimony and the indications are that the record will be completed by April 1. Last Friday the Steel Corporation concluded its defense, reserving the right to call one more witness—the *New York Sun* reporter, who wrote the story on the financial difficulties of the Trust Co. of America, which appeared in that newspaper on Oct. 23, 1907.

Frederick R. Kellogg, counsel for the Great Northern ore trustees, also defendants in the case, has announced that he will call no witnesses and that he will close his end of the case within the next two weeks. This course, he said, was made possible by the acceptance by the government attorneys of certain stipulations made by him. These concerned figures and statistics in regard to Lake Superior iron ore mines and terms of lease; and they included data as to developments in various ore properties before and since the time the Hill ore lease was made.

Government Rebuttal

All that remains to be done toward closing the record is the taking of proof in rebuttal by government counsel. This final series of hearings is to begin about the second week in March and is expected to be concluded before the end of the month. Shortly after that, the opposing counsel will apply for a date on which to present the record of testimony and documentary evidence, supplemented by briefs and oral arguments, before the United States district court in Philadelphia. For that purpose it is expected that a portion of October will be allotted. A decision probably will not be handed down for several weeks, perhaps not for months, and, irrespective of the nature of the first decision, it is certain that the case will then go to the Supreme Court.

William H. Donner, president of the Cambria Steel Co., was the last important witness called by the defense. This was the second time Mr. Donner was on the stand in this case. The first time, in October, 1912, he appeared for the government, and at that time he said:

"I do not think that there is any one of those companies (referring to Jones & Laughlin, Cambria, Lackawanna, Republic and other companies) that could not compete with the United States Steel Corporation and compete successfully."

Mr. Donner was asked to give his reasons for this opinion, and explained it is a simple proposition to build furnaces and steel plants or finishing mills, fully the equal of the Corporation's, and labor can be employed at exactly the same price and there is no difficulty in producing the various products at practically the same cost. By endeavoring to put its competitors

WILLIAM H. DONNER
Testifying at Steel Hearing

out of business, said Mr. Donner, the Corporation, itself, would have to commit suicide. He said, with the exception of a small export business, the Corporation and its competitors sell to practically the same customers and Mr. Donner intimated for this reason all the concerns engaged in a warfare would be about on an equal footing. He further said it would be impossible for the Corporation to wage warfare against one competitor without involving them all. He said he does not fear the Corporation as much as he does other competition.

"I mean foreign competition," said Mr. Donner. "Foreign markets can build their plants lower than the Steel Corporation or lower than we can. They employ cheaper labor than we can secure, and they have lower rates of freight from many points than either the Steel Corporation or ourselves; that is, from seaboard. For example, the rate of import freight from New Orleans to Cincinnati is 12½ cents per 100 and from Pittsburgh to Cincinnati it is 15 cents per 100. There is no duty on billets or nails, and some other steel products. The regular rate of freight from Galveston to Cincinnati, is 16½ cents, while it is 15 cents from Pittsburgh to Cincinnati."

Cambria's Growth

Mr. Donner described the rate of growth of his company since 1901. In that year the Cambria Steel Co. produced 484,011 gross tons; in 1912, it was 948,944 gross tons. These figures, said Mr. Donner, indicated sales. In 1913 the sales were a little more than 1,000,000 tons. The Cambria, he said, ships practically all over the United States and does some business in Canada. It is fully integrated, owning its ore and fuel coal and coking coal. It buys some coke, however. It owns all the processes of manufacture, from the ore up. Mr. Donner described the ore holdings of his company in the Lake Superior district and he mentioned other ore properties controlled by other independent companies and the Steel Corporation. He said that the quantity of ore in sight in the Lake Superior district is now larger than in 1901, despite the fact that an effort is being made now to restrain any increase, on account of the severe taxation.

Ore Taxation and Development

"Increase in what?" asked Mr. Lindabury.

"In tonnage in sight."

"That is, in development?"

"In development, yes."

"Do you mean an increase in the amount of ascertained and developed ore, notwithstanding all that has been taken out in the intervening period?"

"Oh, yes, sir; there has been a large increase, and there has been a new range discovered that has a great many millions of tons," said Mr. Donner, referring to the Cuyuna range. This range, he said, has been developed considerably since he last testified in 1912, and there have also been some large developments on the Gogebic range in Michigan since that time.

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Lifting the Veil Which Has Hidden Prices

Never in the history of the iron trade have we seen anything more illuminating and at the same time more touching, than some of the testimony of Dr. Jeremiah W. Jenks, professor of government in New York University, testifying in the Steel Corporation dissolution suit. We referred very briefly last week to Professor Jenks' testimony concerning trade paper quotations, which, he said, "do not represent the actual buying and selling prices, but simply the general trend of prices, and more frequently, perhaps, the general asking price of some of the leading sellers," and we ventured to express the opinion that even a learned professor will sometimes talk about things concerning which he has very little knowledge. We were not then aware that, sacrificing his time and energy without compensation, Professor Jenks in "preparing certain economic evidence", did so on three conditions: First, that no information of any nature should be withheld from him when he asked for it; second, that they should furnish me all the assistance that I asked for in order that I might be sure that I should not be hampered in getting any information that I wanted," and third, "that I should receive, personally, no compensation."

The professor testified, however, that expenses of assistants were paid, and, he said, "In order that I might get a rather more definite idea as to what was meant by the various iron and steel products, my expenses were paid on one trip to Pittsburgh, but nothing more." The professor says that he thinks he is several hundred dollars out of pocket on account of the time which he spent on this work and he adds that in preparing the special matter on prices and in other work of the kind on which he expected to give an opinion definitely, he selected his own assistant without any suggestions from the Steel Corporation, and the said assistant has worked under the professor's definite direction.

The professor was determined that he would not be like another distinguished professor, Francis Walker, who, under cross examination, in November, 1912, in the same suit, was compelled to admit gross ignorance on many matters relating to the manufacture and sale of iron and steel products. So Dr. Jenks made a trip to Pittsburgh. He found out all about muck bar, skelp and other things. But that was not all he did. With the aid of assistants, freely furnished, he was able to get at real prices. It was not necessary for him to do as ordinary market reporters have done for many years—spend a lot of time, energy and shoe leather in tramping from office to office and plant to plant in search of information in regard to prices. The men who did that were mere reporters. The result of their labors and all their study through long years was not to ascertain prices named in actual buying and selling. These poor, incompetent reporters merely succeeded in showing "the trend of things", and sometimes not even that. They simply went to the great offices of the largest companies, kow-towed to the high officials, tremblingly inquired as to what the asking prices were and passed this information out to the public.

Not so with the professor. He obtained real prices. Men worked under his personal direction and have gotten the actual facts. There is no longer any mystery or deception or difference of opinion. Buyers or sellers need not longer linger in doubt as to what the rock bottom prices are. All that is necessary is to write to Dr. Jeremiah W. Jenks, professor of government in New York University. He will tell all about it.

For many years, there was an eccentric character who wandered around through the central west. His name was J. N. Free. He went from town to town "lifting the veil" and was known as "The Immortal J. N.". He said that he had sacrificed his very name in the cause of truth. Now Professor Jenks has not sacrificed his name, or even abbreviated it to Jere. But he has lifted the veil of mystery which has long enveloped real prices. If you want to know the whole truth about prices, write to him, Dr. Jeremiah W. Jenks, professor of government in New York University, New York City.

Concentration Versus Competition

The Kokomo Steel & Wire Co., which has been operating a rod and wire mill for 13 years, has recently added a blooming mill and two large open-hearth furnaces to its equipment in order to provide its own supply of billets and thus avoid dependence on the open market for semi-finished steel. This com-

pany, therefore, ceases to be a purchaser of billets. Two hundred miles away, the Wisconsin Steel Co., a subsidiary of the International Harvester Co., has added to its plant a merchant bar mill with a capacity of 3,000 tons per month on single turn, in order to bring the finishing capacity of the works to a parity with the steel-making and blooming mill capacity. This company will, therefore, have no more billets to sell.

One manufacturer builds a blooming mill because the purchase of billets in the open market is unprofitable, and another builds a finishing mill because the sale of the same product is equally unsatisfactory. Thus the floating supply of semi-finished steel is becoming more and more curtailed and the tendency toward concentration in the steel business grows apace. The net result is to reduce the amount of competition in the trade regardless of the theory of legislators.

Pig Iron and the Tariff

Three or four months ago, considerable apprehension was being expressed and some rather alarming statements were being uttered as to the extent that foreign pig iron with duty free might be expected to invade the territory along or adjacent to the seaboard. This uneasiness and uncertainty among domestic producers was especially noticeable along the north Atlantic seaboard, where numerous dense consuming localities have offered attraction to the foreign maker seeking to extend his market.

It now has been more than four months since the new tariff bill was enacted. In that period, foreign iron makers no less than domestic furnaces have faced the pressing necessity for increasing their sales because both have been experiencing such a shrunken demand that new tonnage has been welcomed almost at any cost. Prices both at home and abroad were driven as low, apparently, as production costs and final prudence would permit. Middlesbrough warrants down to 47 shillings have compared in the severity of their decline with $14.25 to $14.50, tidewater, for northern No. 2X.

Despite these prices abroad, unusually attractive for the consumer, the sales of foreign-made iron in the eastern seaboard zone have been so extremely small as to be of no practical significance. As far as positively known, only one or two transactions in foreign iron were closed and these called for special quality iron and only a few tons figured. It is reported that one large eastern consumer bought English warrants for a cargo, but subsequently resold abroad his holdings without moving the iron.

At this time, the talk of a raid by foreign makers upon the eastern iron market has almost completely died away. Consumers are not even putting out so liberally as several months ago tentative inquiries largely to satisfy their curiosity as to what they might be able to do on English and German metal. The reason for all this is obvious. The experience of the past several months has pretty conclusively shown that on a low market at home and abroad domestic makers have little to fear from foreign competitors. Now the extremely low prices among eastern producers and in Europe have disappeared. Foreign iron has advanced further than domestic. Recent English warrant quotations represent a rise of more than $1 a ton. The eastern tidewater market has advanced probably 50 to 75 cents a ton.

So far, the tariff, with respect to pig iron at least, has produced no harmful consequences for the home manufacturer. It needs to be emphasized, however, that the world's markets have been on an unusually low plane where price elasticity practically had ceased. The effect remains to be shown when home prices shall overtake and advance more rapidly than those abroad. Some students of the situation declare such a contingency is not likely to arise, because the menace of foreign competition will be an effective restraint. However that may be, recent experience suggests that the concern of the domestic producer over the tariff lies not in low markets nor necessarily in high markets, but in a condition of irregular price fluctuations at home and abroad under which a margin of safety may not always be maintained.

The late Joseph Fels, millionaire of Philadelphia, has been described by Mayor Baker, of Cleveland, as not only a successful merchant and manufacturer, but also a "successful visionary, who surrendered his life to a great ideal, which made him a spiritual force". Whether men agree with Mr. Fels' views or not, all can rejoice that he was one of the number of business men who delight in dreaming of the dawn of better days and are willing to do much to hasten the coming. May their tribe increase!

The Effect of Words

Skillfully worked out plans for increasing shop production often fail because of the unfortunate manner in which they are presented to the employes concerned. The phrase "scientific management" itself is becoming opprobrious to many workmen and to many minds the word "scientific" conveys the impression of impracticability. "Task", numerous discussions have indicated, is frequently translated as wage slavery. "Non-productive" is a useful term in the accounting department, but shop men usually consider it equivalent to non-workers. "Indirect labor" means the same thing to the accountant and creates no friction in the shop. No man likes to be disciplined and therefore the word "disciplinarian" is offensive. "Speed boss", a very descriptive phrase, which appears frequently in discussions of the Taylor system of management almost invariably breeds antagonism and is interpreted to mean slave driving. The entire spirit of the shop may frequently be changed by giving thought to the language in which orders and explanations are clothed.

HEAVY BUYING

By the Railroads Expected by President Starbuck.

C. A. Starbuck, president of the New York Air Brake Co., speaks expectantly of heavy equipment buying by the railroads, in submitting his annual report to the stockholders. Mr. Starbuck says that only 108,000 freight cars were ordered during 1913, as compared with 235,000 cars during 1912 and that this deficiency must be made good as soon as the railroads can finance the expenditure.

Speaking further, he says: "The year 1913 has expired, and it is believed that acute depression has gone with it. The tariff and currency bills have become realities. It is not for us to say they will not be productive of benefit to the people and result in prosperity. Apparently the one thing requisite to start immediately the wheels of commerce is that railroads be allowed their requested advance in freight rates, for business cannot prosper save when the railroads are prosperous and only in proportion as they are prosperous."

Total sales of the New York Air Brake Co. for 1913 were $3,186,543, showing a net profit of $834,512. The surplus for the year was $54,968, making a total surplus of $231,510.

Acquires Industrial Car Plant

The Easton Car & Construction Co., Easton, Pa., has been incorporated with a capital stock of $50,000, and has purchased the records, drawings, blueprints, good will, etc., of the Ernst Wiener Co., together with all material in possession of this company at its plant at Easton, Pa. The new company also has acquired the capital stock of the Ernst Wiener Co., Philadelphia. The former line of production, consisting of the manufacture of industrial cars, turntables, frogs, switches, etc., will be continued. In addition, the fabrication of light plate and structural iron work for tanks, bins, etc., will be followed. W. E. Farrell, who formerly was vice president and general manager of the Treadwell Engineering Co., Easton, Pa., is president of the new company.

Staff Dinner.—The International Oxygen Co., Newark, N. J., recently tendered its staff a dinner at the Hotel McAlpin, New York City. The object was to bring more closely together the manufacturing and selling departments of the company. Among those present were Solomon Heller, Mr. and Mrs. Samuel Heller, Mr. and Mrs. A. A. Heller, E. W. Irwin, I. H. Levin, Mr. and Mrs. H. L. Barnitz, Mr. and Mrs. C. Aichberger, Mr. and Mrs. D. J. Tonkonogy, Miss Celie Weiss, Miss Leona Friedland, H. W. Timm and Philip Fried.

EXPOSITION PALACES

At Panama Pacific Exposition Will be Ready on Time.

San Francisco, Feb. 20.—Charles C. Moore, president of the Panama Pacific International Exposition, states that the progress of the physical side of the exposition work during the past year enables him to repeat with assurance the promise originally made two years ago, when he said that the exposition would be ready when its gates open on Feb. 20, 1915. All construction work, says President Moore, is fully up to schedule, which calls for the completion of the exhibit palaces by July 1, 1914. The great machinery palace is practically completed now, and several more will be finished in April or May and will be ready for the installation of exhibits by July 1. There will be approximately 60,000 exhibits from all parts of the world installed in the main exhibit palaces.

"The plans for a great naval pageant are progressing well," says President Moore, "and from assurances already received I am justified in believing that there will be few, if any, nations possessing navies that will be unrepresented in the great fleet which will assemble at Hampton Roads, sail through the Panama canal and through the Golden Gate to take part in our opening exercises.

"Detachments from the armies of many nations will gather in the exposition grounds during 1915 and in friendly rivalry will illustrate their proficiency in feats of arms."

Makes Welding Outfits

Alexander R. Boyce, Inc., Long Island City, N. Y., which recently was chartered with a capital stock of $10,000, will engage in the manufacture of electric welding outfits. This outfit, the company advises, will consist of an oil engine, close coupled to a specially designed generator, for use in the repairing of boilers and of broken stern frames, the caulking of edges and the reinforcing of wasted surfaces. The company has installed such plants along the Great Lakes for the Great Lakes Electric Welding Co., the Great Lakes Towing Co. and Taschenberg Bros., of Erie, Pa.

PERSONALS

J. H. REGAN, assistant secretary of the Pressed Steel Car Co., has been elected assistant treasurer. The other retiring officers were re-elected.

WM. LODGE, president of the Lodge & Shipley Machine Tool Co., Cincinnati, has returned to his office duties after an illness of four or five weeks.

I. B. SAUNDERS, the new manager and J. W. Stannard, the new industrial engineer of the Spirella Co., Lincoln, Neb., were honored by an impromptu reception at the Commercial Club.

J. RALPH FINLAY, consulting engineer, New York, will read a paper on "Mine Valuation," March 3 before the structural section of the Engineers' Society of Western Pennsylvania, in the society rooms, Oliver building, Pittsburgh.

SCOTT R. HAYES, vice president of the Railway Steel Spring Co., has resigned to become assistant to the president of the New York Air Brake Co., effective March 1. No successor of Mr. Hayes with the Railway Steel Spring Co. has been appointed.

R. T. SCOTT has been appointed manager of the Pittsburgh district of the Independent Pneumatic Tool Co., Chicago, with offices at 1208 Farmers' Bank building. F. H. Charbono has been appointed manager of the southern district, with offices at 1629 Candler building, Atlanta, Ga.

G. H. CHARLES, assistant secretary and general manager of the American Rolling Mill Co., Middletown, O., who suffered from a fall from a horse several weeks ago, which injured his shoulder and broke the collar bone, has recovered sufficiently to be able to start on an European trip in the interest of American ingot iron.

W. H. BLAUVELT, consulting engineer, Semet-Solvay Co., Syracuse, N. Y., read a paper of "By-Product Coke Ovens," Feb. 19 before members of the Pittsburgh section of the American Chemical Society. The meeting was held in the rooms of the Engineers' Society of Western Pennsylvania, Oliver building, Pittsburgh. The talk was illustrated with lantern slides.

F. J. JOHNSON, Chicago, has been elected a director of the Avery Co., Peoria, Ill., to succeed A. Y. Bartholomew. This was the only change in the board of directors. Officers re-elected are: J. B. Bartholomew, president; H. C. Roberts, vice president; E. A. Cole, treasurer; G. Lavery, secretary; F. P. Kinsey, superintendent; V. E. Bronner, sales manager; R. J. Boynton, assistant treasurer; E. M. Voorhees, assistant secretary.

WILLIAM WUTHENOW, who has been assistant to Chairman John A. Topping of the Republic Iron & Steel Co. at New York City, has been made general superintendent of the Western district of the Republic company with headquarters at Chicago. Mr. Wuthenow will be in charge of the Inland works at East Chicago, of the Indiana bolt and nut plant at Muncie, Ind., and of the Sylvan plant, Moline, Ill. He succeeds C. P. Burgess, resigned.

Swank's Gift.—James M. Swank, for many years secretary of the American Iron and Steel Association, has donated his entire library, consisting of many volumes of great historical value, to the Cambria Library, Johnstown, Pa. Mr. Swank's benefaction was accepted at a recent meeting of the trustees of the library.

Able Papers Read at Meeting of Mining Engineers

Including Discussion of Questions Relating to Iron Ore Mining and the Making of Steel—Sir Robert Hadfield, Conspicuous Contributor

While discussions were not so keen and spirited as at previous sessions, the New York meeting of the American Institute of Mining Engineers, Feb. 16, 17, 18 and 19, was featured by an unusually complete array of technical papers. Of especial interest and timely significance, were the proceedings of the iron and steel committee, this branch of the institute ably maintaining the prestige it has acquired as a result of its achievements in recent years. A noteworthy feature of the meeting was the initial session of the petroleum and gas section, which began its existence in a very promising manner. There also were sessions on mining law and mining geology, while sessions were set apart for the reading of papers on miscellaneous subjects. Between 300 and 400 members, exclusive of guests, were present at the meeting.

Some Novel Features

The meeting was opened formally on Monday night with the address of welcome by the retiring president, Charles F. Rand. Mr. Rand was introduced by Past President Albert R. Ledoux, who congratulated him on the great development of the institute during the year of his incumbency. President Rand, in turn, expressed his appreciation and said that the real explanation of this development was the hearty co-operation of the members. The remainder of the opening session was devoted to a varied program for the entertainment of the members and their wives. First, a lantern slide entitled "The Present and the Future" was thrown upon the screen. This showed a cherub with the face, unmistakably, of President Rand, while over the horizon was seen ascending the new "Sun of Butte", the new president, Benjamin B. Thayer. The next number was a comic report on "The State of the Institute" by an "Expert". There was considerable conjecture as to the name of the author of this report and the general consensus of opinion was that the responsible party was Prof. Jas. F. Kemp. Following the reading of this report, as set forth elsewhere in this article, there was thrown on the screen a remarkable series of photographs taken in all corners of the world, this being accompanied by a lecture telling of the dangers and difficulties the photographer encountered.

Announcement of the balloting for new officers was made at the annual business meeting on Tuesday. The election of the following nominees was announced: Director and president, Benjamin B. Thayer; director and vice president, H. C. Hoover; director and vice president, W. L. Saunders; director for district 11, R. W. Brock; director for district 6, C. W. Merrill; director for district O, Albert R. Ledoux; director for district 1, Henry L. Smyth; director for district 7, D. C. Jackling.

The membership committee submitted an extremely interesting report, which showed that the increase in membership during 1913 was larger than the aggregate for the three years preceding.

The New President

Benjamin Bowditch Thayer was born in San Francisco in 1862. *He prepared for Harvard University at Quincy, Mass., and was graduated from the Lawrence Scientific School in* 1885. *On leaving college, he engaged in mining in the Rocky Mountain section and in the Sierra Madre in Mexico. After years of experience in underground work and in administrative relations in a number of mining districts, he became identified with copper mining in Butte and some years ago was elected president of the Anaconda Copper Mining Co., which office he still holds. Mr. Thayer is a member of the advisory committee upon the conduct and development of mining education at Harvard and has been very active in matters affecting the alumni of his alma mater. He became a member of the Institute in* 1887.

President Rand announced Tuesday that the newly organized directors had made the following elections for the coming year: Sidney J. Jennings, first vice president; Geo. C. Stone, treasurer; Bradley Stoughton, secretary; B. A. Robinson, assistant secretary.

On Tuesday evening, the members and guests met at the Museum of Natural History, where Howard W. DuBois delivered a lecture on "Hydraulic Mining in British Columbia", which was illustrated by colored lantern slides.

On Wednesday evening, the annual subscription dinner was held in the Waldorf apartments at the Waldorf-Astoria hotel. A reception was tendered to the newly-elected president and the retiring president, while the newly-elected president was introduced to the members at the close of the dinner.

Sir Robert Hadfield's paper on "Sound Ingots" contained a record of tests made on ingots produced by the so-called "Hadfield method". As described in papers previously submitted by the writer, this method consists of pouring pure steel into an ingot mold, which is provided with a sand feeding head. After the ingot is poured, charcoal and an insulating slag layer are put in the head and an air blast turned on, thus keeping the head in a fluid condition. By this means, the main body of the ingot, as it contracts in cooling, is fed by gravity with fluid metal from the feeding head. By this method, the writer says, ingots can be produced in which the discard is not greater than 6 or 7 per cent, and of which the salable product in billets runs as high as 91 per cent, including loss by oxidation in heating and rolling.

The "Hadfield Method"

A feature of his method, said the writer, is that the quality of the ingot as to freedom from blow-holes, pipes, etc., may be determined without going to any further trouble than a casual inspection of the cavity in the feeding head. Machining and other observations by mechanical methods are unnecessary to test ingots made by the Hadfield method, although such means are necessary to determine the structure of ingots poured in the usual way, said the writer. The paper described experiments conducted on nine 15-inch ingots made by the Hadfield method. The feeding heads of these ingots, after cooling, showed an average loss in weight of 139 pounds, the minimum being 128 pounds and the maximum 162 pounds. In other words, about 4 per cent of the total weight of the ingot passed from the feeding head to the body of the ingot. The chilling of the surfaces of ingots, as poured in the ordinary manner, said the writer, prevents the maintenance of ferro-static pressure, thus rendering it almost impossible for the resulting ingot to have a sound core. By the Hadfield method, however, the paper concluded, ferro-static pressure is kept up to a very late stage.

Hendrich J. Freyn submitted a paper entitled "Notes on the Utilization of Blast Furnace and Coke Oven Gas for Power Purposes". Mr. Freyn took up the difficulties encountered in the earlier days, when it was found impossible to maintain satisfactory parallel operation of coke oven gas engine generators operating into the same system. He ascribed these difficulties

largely to ignorance on the part of the designers, saying that gas ports and gas valve areas were made too large and entirely out of proportion to the size of the air ports, since no attention was paid to the low specific gravity of coke oven gas. These difficulties, Mr. Freyn said, can be overcome at present by the correct application of a few simple laws. Today the coke oven gas engine has reached such a high state of perfection in Germany that it is second only to the blast furnace engine in importance and in serviceableness, with the qualification, however, that unit capacity and more particularly the rating, must be conservative. The paper included numerous descriptions of coke oven gas engines, which are operating successfully in Germany. Mr. Freyn described the advantages which may accrue to a blast furnace operating company through the sale of its surplus coke oven and blast furnace gas. The argument that the blast furnace cannot be depended upon for a constant source of gas supply, he said, has been disposed of by the innovation of S. H. Brassert, by which it is possible to transform a non-active blast furnace into a huge gas producer. Mr. Freyn's paper included a number of blast furnace cost sheets with data for both a 350-ton and a 450-ton furnace. His conclusions were that the installation of 450-ton blast furnaces offers advantages over that of furnaces of 350-ton capacity. Also that the unit cost of making coke oven gas in a larger coking plant is a great deal less and that the total revenues from the utilization of blast furnace and coke oven gases, are considerably greater with larger than with smaller blast furnaces. Also that the use of a mixture of blast furnace coke oven gas for all power purposes is shown to yield substantial financial returns.

SIR ROBERT HADFIELD,
Prominent contributor of paper on "Sound Ingots"

"Research With Regard to Non-Magnetic and Magnetic Conditions of Manganese Steel" was the title of a paper presented by Prof. B. Hopkinson and Sir Robert Hadfield, but written, in the main, by the latter. After summarizing what previously had been known with regard to this subject, the authors set forth the results of some very interesting experiments which they had conducted over the last three years. Manganese steel, while non-magnetic, naturally, can be made magnetic; the experiments show that while low temperatures—that is, liquid air temperatures—render iron and nickel alloys magnetic, they have not the slightest effect upon manganese steel. The only manner in which manganese steel can be made magnetic, is to subject it to heat treatment, and a good deal depends upon the nature of the heat treatment. Assuming the specific magnetism of pure Swedish charcoal iron to be 100, it was found generally that temperatures below 400 degrees had little effect in increasing the specific magnetism of manganese steel. Some of the results obtained were as follows: A specimen treated three hours at 600 degrees Cent. showed a specific magnetism of 12.2; another heated at 500 degrees for six hours, showed 20.4; one heated at 500 degrees for 48 hours, showed 40.2; a specimen heated at 500 degrees for 600 hours, had a magnetism of 42.0. The writers believe that a longer exposure to the heat treatment would result in a still higher degree of specific magnetism. An incidental effect of the heat treatment was an increase in the Brinnell ball hardness number. While the ball hardness number of ordinary manganese steel is about 200, the various specimens after heat treatment had ball hardness numbers ranging between 200 and 495. Generally, the higher ball hardness numbers and the higher specific magnetism percentages occurred simultaneously. The writers are opposed to the theory that the high specific magnetism of the specimens after heat treatment is due to the presence of alpha iron.

Gas Cleaning

A. N. Diehl submitted a paper entitled "Data Pertaining to Gas Cleaning at the Duquesne Blast Furnaces". The paper was a review of data heretofore submitted by the writer on the subject and included additional data and photographs recently secured.

A. B. Murray, of Cleveland, presented a paper on "The Need of Uniform Methods of Sampling Lake Superior Iron Ore". Mr. Murray suggested the following method for sampling cars: Starting at a point one foot from the end of the car, move in a straight line lengthwise through the middle of the car over the piles of ore, taking thick bulks of ore over three feet. Measure these distances, and at the designated point, dig about four inches below the surface and take a measured bulk of either lump or fine, whichever is encountered. This method of sampling could be elaborated by going across the car twice more on lines about two-thirds of the distance from the center of the car to the side of the car, which thus would touch the ore

in three times as many places and in the case of mixed ore, would tend to give a more representative sample. This elaboration, Mr. Murray thinks, is not necessary, however, in the majority of cases.

J. E. Johnson Jr. submitted a paper on the "Influence on Quality of Cast Iron Exerted by Oxygen, Nitrogen and Some Other Elements". This was published in last week's issue of THE IRON TRADE REVIEW.

C. M. Weld read a paper entitled "Notes on an Iron Ore Deposit Near Hongkong, China". C. K. Leith read a paper entitled "Notes on Conservation of Lake Superior Iron Ores". The questions as to what grades of ore it pays to conserve for the future, and the valuation of low grade reserves, said Mr. Leith, are becoming immediate and definite, as applied to individual ore deposits and seem to call for some sort of quantitative answer. He assumes that it will not pay either for the individual or for the state to conserve any ore when the present cost of conservation, when compounded at 6 per cent interest for the number of years which would elapse before this ore is used, will exceed the profit which the ore will yield when it is used, and he deduces that any expenditure of money or effort now, which when compounded will exceed the worth of effort or money needed in the future to utilize the iron, is a net loss both to the individual and to the community. The paper is accompanied by a chart for determining compound interest at 6 per cent for any period between one and four years.

Electricity in Mines

Albert Sauveur read a paper entitled "Notes on Some Heating and Cooling Curves of Prof. Carpenter's Electrolytic Iron". A paper by Wm. Kelly and F. H. Armstrong described the "Use of Electricity at the Penn and Republic Iron Mines, Michigan". J. E. Johnson Jr. opened a discussion on this paper by asking how the hoisting efficiency at the Penn compared with that obtained at the Anaconda by the use of Nordberg air hoists, where he understood an efficiency of 50 per cent was obtained. K. A. Pauly demanded to know where Mr. Johnson got his figure of 50 per cent, saying that the real figure was 29 per cent, and this did not include provision for the reheating of the air. Mr. Pauly also said that in his experience one of the most troublesome pieces of machinery in existence was the air-end of an air compressor. Mr. Johnson replied that the over-all efficiency in Butte had been published as 50 per cent, and he was of the opinion that an electric motor was a greater source of trouble than the air-end of a compressor. In reply to questions by Mr. Pauly, Mr. Armstrong stated that the saving in maintenance on the electrical centrifugal pumps as against the older steam-driven plunger pumps was chiefly on the water end and that in the unique type of water rheostat used, the resistance could be anything desired and the slip varied from 20 to 6 per cent, the usual slip in running being from 7 to 8 per cent.

C. D. Young, O. D. A. Pease and C. H. Strand, jointly, submitted a paper on the heat treatment of steel castings. This paper described a heat treatment process used at the Altoona shops of the Pennsylvania railroad for producing cast steel of stronger structure than that found in the usual annealed steel castings.

W. S. Potter, of Pittsburgh, submitted a paper on "Manganese Steel, With Especial Reference to the Relation of Physical Properties to Microstructure and Critical Ranges". The writer described a series of experiments in which were noted the retardations in heating and cooling.

Capt. Hunt on Rails

In a paper on "The American Steel Rail Situation", Capt. Robert W. Hunt reported that in his endeavor to secure the establishment of a system of more constant and thorough inspection of rail making he has received the support of many of the railroad companies and of the several steel companies. He said that sound rails can only be made from sound ingots, and that it is possible to make sound ingots, although it costs more. He emphatically states that the physical treatment of the metal is of at least of equal importance with its chemical composition. Sir Robert Hadfield, in a paper on "Manganese Steel Rails", described the wearing qualities of rails rolled from manganese steel. In actual service, he said, they have given very satisfactory results.

S. G. Valentine, in a paper entitled "Notes on Blast Furnace Operation with a Turbo Blower", described his experience at the Oxford furnace, New Jersey, which is provided with a turbine-driven rotary engine, as previously described in THE IRON TRADE REVIEW. The results, he said, have been very satisfactory and gratifying. The writer believes that the turbo blower measures the volume of air used with more accuracy than the calculations based on piston displacement in other types of blowing engines, and is inclined to a preference for the steady stream of air furnished by a rotary blower.

H. W. Rogers presented a paper on "The Application of Electric Motors to Shovels". A paper entitled "Pig Steel from Ore in the Electric Furnace", was read by Robert M. Keeney. He described the conditions necessary for the electric furnace production of pig steel, the regulation of carbon, the elimination of impurities. As good a grade of pig steel can be produced in an electric furnace when operated continuously as when operated intermittently, he said. Prof. Henry M. Howe and Arthur K. Levy presented a paper entitled "Notes on the Plastic Deformation of Steel During Overstrain". W. N. Best read a paper on "Scientific Installations for the Economical Burning of Liquid Fuel of any Specific Gravity".

A Beautiful Calendar

The Virginia Iron, Coal & Coke Co. has recently sent out to its patrons a large and elaborately illustrated calendar. The calendar is 5 feet long by 2½ feet wide and has three large views in colors showing the operations of the company. The pictures, which are strikingly like paintings, give a general view of the Radford furnace, Radford, Va.; a night scene in the casting house of the Dora furnace, Pulaski City, Va., and the two Crozer stacks at Roanoke. The calendar advertises the various grades of pig iron, coal, foundry and furnace coke produced by the company. The general offices are at Roanoke, Va.

Promoting Safety. — The second monthly conference of the Chicago local council of the National Council for Industrial Safety was held at the City Club, Wednesday, Feb. 18. An exhibit of motion pictures was given by Henry L. Brownell, superintendent of the safety committee of the Chicago surface lines, who is exhibiting them in an effort to reduce accidents on the streets. Charles B. Scott, manager of the bureau of safety of the Commonwealth Edison Co., spoke on "Efficiency and Humanitarianism", and a general discussion followed. An exhibit of 1,200 safety pictures, loaned by the industrial commissioner of Wisconsin, has been placed on exhibition at the City Club, Chicago, for educational purposes.

IRON MINING NEWS

Eastern Mesabi Discovery

Reports in circulation on the Mesabi are that Geo. A. St. Clair has discovered a large body of ore east of the Spring mine, at the extreme eastern end of the range. It is added that while much of the mineral is of a structure permitting of shipments as fast as the material is mined, the bulk of the deposit will require concentration. Mr. St. Clair has had drills in commission in the district for several months, and much interest has been attached to the work.

In the early days of the Mesabi, the eastern end of the range was the center of activity. Operations gradually shifted to the west as ore bodies were found in that direction and for years the eastern end has been neglected. It is said that tests have shown that the St. Clair ore is easy of concentration. There is a belief that material of better grade exists in the field and it is considered likely that important new exploratory work will be instituted the coming summer.

Drilling on Mesabi Range

Rarely has there been in progress in the Hibbing and Chisholm region of the Mesabi range such an extensive volume of drill work as at present. Most of the operations are being conducted by and for the United States Steel Corporation.

The drill work is not strictly exploration, but is a checking-up process. The lands on which the operations are under way have been tested previously and their mineral value is known approximately. It is to map out deposits and gain accurate data of the extent, quality and other characteristics of the ore bodies that the present work is in progress.

Since the remainder of the Great Northern lands held by the Steel Corporation are to be surrendered the first of next year, it is advisable that the company open more of its own deposits. The drilling in the Hibbing and Chisholm country is with this object in view. It is expected that the work of opening several mines will be undertaken in the spring. Some of these eventually will rank with the biggest shippers on the range. Not only has the Steel Corporation practically all of its own drills in service, but probably 60 others are being operated under contract. Of these, the Carlson Exploration Co. alone has 20 in commission. Included among the other contractors are the Longyear company, Cole & McDonald and Geo. A. St. Clair.

Two properties that the Steel Corporation is preparing to open in the Virginia district of the Mesabi are the Prindle, a prospective open pit, and the Richelieu, which will be an underground producer. The Prindle is north of the city of Virginia and near the Alpena mine. Its deposit is of large proportions. The Richelieu adjoins the Yates location and is adjacent to the town of Kinney. The overburden is of such depth and character that all the ore will be taken out through shafts.

Develops Rich Ore at Wharton, N. J.

A new body of iron ore, rich in quality, has been encountered by the Thomas Iron Co. in No. 5 slope of its Richard mine at Wharton, N. J. The new body at present has been developed to a width of 13 feet 4 inches, and its full extent has not yet been reached. A sample taken across this vein shows ore analyzing 66.58 per cent in iron, 0.35 per cent in titanium and 0.070 per cent in vanadium. Another body of rich ore also has been encountered in the No. 6 slope of the mine, which runs in iron about 66 per cent, in titanium about 0.72 and in vanadium 0.063. Although the Richard mine is not extensive in area, it possesses one of the richest veins of magnetite in northern New Jersey and it is not necessary to concentrate the mineral.

The Thomas Iron Co. now is using in its furnaces a mixture of the magnetite iron ores of New Jersey and lower New York, with the hematite ores of eastern Pennsylvania. About 15 per cent of hematite ore from a mine that was believed to have been worked out a generation ago, but now is producing about 1,200 tons per month is being used. There are several such deposits in Lehigh county and operations now are being carried on in a small way at five mines, while preparations are being made to develop some other properties. It is the policy of the Thomas Iron Co. at the present time not to increase the capacity of its furnace plants but to put its present properties into an improved and more efficient position.

Fargo Property Idle

At the extreme western end of the Mesabi range, adjacent to the Mississippi river, the Jones & Laughlin Steel Co. has suspended work at the Fargo property for the winter. The company recently acquired a 50-year lease on both the Fargo and Buckeye tracts. It is believed that the exploratory work in progress the last year has proved satisfactory. It is understood that the Fargo property will be stripped the coming season, possibly by the hydraulic process. Work at the Buckeye will continue during the winter.

At Grand Rapids, the seat of Itasca county and the center of the new western field, it is hoped that the Steel Corporation will extend its Duluth, Missabe & Northern railroad to that point this year. The terminus of the line is at Coleraine, 10 miles distant. The new mining town of Fayton would be tapped by the proposed extension and there is, in addition, the prospect of traffic from the Jones & Laughlin lands and from the town of Grand Rapids itself.

Railroad Activity on Cuyuna

The Northern Pacific railway has built a spur to the Kennedy mine of the Rogers, Brown Ore Co., at Cuyuna, and may divide the haulage of its tonnage, the Soo taking half and the Northern Pacific half. The Soo was the pioneer in low ore hauling rates, cutting from 80 cents a ton to 65 cents. It is further pledged in ore carrying contracts on record to lower to 60 cents when 2,000,000 tons are hauled. The Northern Pacific railway will soon build a spur line to the Canadian-Cuyuna Ore Co. property, near Loerch.

The Cuyuna-Mille Lacs mine is entirely unwatered. Additional crews are to be added in March. The Cuyuna-Duluth mine at Ironton has its shaft down 310 feet and is now cutting a station at the 280-foot level. The Duluth-Brainerd shaft is now down 92 feet. The Brainerd-Cuyuna mine in Brainerd struck a heavy flow of water at 80 feet. Heavy pumps will be needed to continue further mining. Another shaft will be sunk and this will serve to unwater the first.

NEW BUSINESS

In New York, underlying conditions in the machinery market have improved somewhat since the first of the year, but the change is scarcely appreciable as far as sales are concerned. The firmer tone in the iron and steel industry has not been accompanied by an increase in the volume of machinery sales. Some weeks, naturally, are better in business booked than others, and the past week appears to have been slightly better than the average since the first of the year. The character of the business, however, was not such as to indicate that machinery users have departed from their policy of spending as little as possible and putting off the day of the purchase. Buyers still tend to enter the market only for such machinery as they cannot do without, and as a rule, they continue to show more interest in second-hand than in new equipment. On the whole, the present market is one for "salesmen" rather than "order-takers". Export machinery demand has flattened out somewhat.

In Pittsburgh, slightly better trade conditions are reported by machine tool builders and dealers, and the first three weeks of this month were much more satisfactory than the corresponding period in January, a decidedly dull month. New plants at Economy and Franklin, Pa., will require considerable equipment, inquiries for part of which have come out. Builders of heavy rolling mill machinery, operating largely on contracts placed six or eight months ago, say they have not experienced much change in conditions that have prevailed for several months.

In Chicago, conditions are about the same as for the past few weeks. Orders are coming mostly for single tools, although some larger contracts are in hand. Railroad demands are somewhat increased, though still far from normal. Operations in general among machine tool makers are about 85 per cent of normal.

In Cincinnati, the machine tool market is drifting along without any change since the first of the present month. Statistical reports for January show that more tools were sold during that month than in any similar period during the last half of 1913. Most of these sales were for single tools to domestic users. Foreign trade has been very dull for the past seven months. The outlook for February is that machinery business for this month will equal that of January. Second-hand machinery is not selling up to expectations. Special machinery, such as laundry, mixing and sugar machinery, is the best in demand, and local manufacturers of this line are fairly busy.

NORTHEASTERN STATES

RUTLAND, VT.—The Rutland Foundry & Machine Co. has been organized and has bought a site for a 49 x 100-foot building.

BOSTON.—New England Pressed Steel Co. has been incorporated; $26,250; by Barton R. Felton, John A. Calhoun, Howard Townsend, et al.

LOWELL, MASS. — The Scannell Boiler Works has been incorporated; $50,000; by Bartholomew Scannell Jr., George P. Scannell, Mary L. Scannell.

PITTSFIELD, MASS.—The General Electric Co., Schenectady, N. Y., will erect a $500,000 addition.

SOUTH BOSTON, MASS.—Fred L. Hewitt has purchased the American Sugar Refining Co.'s plant at the corner of West Second and Granite streets. He will remodel it and install a modern elevator and sprinkling system; a spur track is ordered.

SPRINGFIELD, MASS.—The Springfield Gaslight Co. plans an $87,000 addition to its retort house on Water street; Fred T. Ley & Co. has the foundation contract and the Dieder-March Co., Perth Amboy, N. J., has the building contract.

WORCESTER, MASS. — The Worcester Pressed Steel Co. will build a rolling mill on Barber avenue; estimated cost, $20,000.

HARTFORD, CONN.—The Stanley Works has increased its capital stock $500,000 in order to build a branch plant in Canada; H. B. Humason, secretary.

NEW BRITAIN, CONN.—The Skinner Chuck Co. opened bids Feb. 14 for a factory building to be erected this summer.

NEW BRITAIN, CONN.—W. L. Humason of the Humason & Beckley Mfg. Co. has gained control of the Peck & Young Co., Forestville, Conn., which he plans to enlarge both in capacity and purpose.

NEW LONDON, CONN. — Oliver Woodworth has the contract for the addition to the foundry of the Brown Cotton Gin Co. Work will start when the weather permits.

ALBANY, N. Y.—The Municipal Gas Co. will erect a large steam power generating plant.

ALBANY, N. Y.—Pratt & Cady Co. has been incorporated; machines, valves, spigots; $600,000; by W. B. and J. O. Lasher, Bishop White, West Hartford, Conn.

ARKPORT, N. Y.—Bids will be received in April for a municipal water system; estimated cost, $20,000; Chas. C. Hopkins, Cutler building, Rochester, engineer.

NEW YORK CITY. — Rice & Co., Mt. Vernon street, N. Y., will lose about $5,000 by a fire which badly damaged their wire factory.

NEW YORK CITY. — Russell B. Smith, Inc., has been incorporated; engineering; $100,000; by W. R. Morgan, R. B. Smith, P. C. Idell, 220 Broadway.

NEW YORK CITY.—General Ore Concentrating Co. has been incorporated; $40,000; by F. M. Van Wagonon, H. S. Fluckiger, P. S. Hill, 41 Pinehurst avenue.

NEW YORK CITY.—Magee Valve Co. has been incorporated; $25,000; by G. H. Schubert, B. M. Schwarzlow, D. De Motto, 50 Church street.

NEW YORK CITY.—Bishop Gutta Percha Co. will erect a $30,000, 5-story, 50 x 98.9-foot factory at 417 East Twenty-fourth street; F. F. Ward, architect.

NEW YORK CITY. — Jacob H. Becker will erect a 31.8 x 100.5-foot fireproof building near First avenue on Fifty-second street; estimated cost, $25,000; George J. Hardway, architect.

ECONOMY, PA.—The Standard Seamless Tube Co., which is building a new plant at this point, has entered the market for a small list of machine tools. The plant is made up of a series of four buildings, all of which are practically under one roof. Sections are 160 x 480, 80 x 160, 50 x 260 and 50 x 80 feet. As previously announced, the McClintic-Marshall Co., Pittsburgh, will furnish the structural steel, involving 800 tons.

ERIE, PA. — Henry Mayer will erect a $250,000, 10-story steel and reinforced concrete building this spring for manufacturing corporation and other offices.

GREENSBURG, PA.—The Hempfield Foundry & Machine Co. has let the contract for erecting a steel frame, concrete and sheet iron building to the Lawrence Steel Construction Co.

GREENVILLE, PA.—The Chicago Bridge & Iron Co. plans to double present capacity, and will erect new buildings.

JOHNSTOWN, PA. — The Cambria Steel Co. has closed negotiations for a tie plate punch.

KITTANING, PA.—Plans for the county bridge over the Allegheny river at Ford City will be received this week and bids will be advertised immediately.

LEBANON, PA.—The Iron City Foundry Co. has decided to rebuild its plant which was destroyed by fire Feb. 12; work to begin as soon as financial arrangements can be made, weather permitting.

MERCER, PA.—J. J. Rezner, James Orr, and J. M. Campbell have been appointed a committee to investigate the planished iron mill at Belington, W. Va. The Renzer Stove factory uses much of this product, and men in the city have subscribed $30,000 for the establishment of such a plant here.

MYERSTOWN, PA. — The Myerstown Foundry & Mfg. Co. has been incorporated; $10,000; by Leighton F. Krum, Edward Karsnitz, Frank Lutz.

OAKLAND, PA.—The E. J. Thompson Co., automobile constructor, has purchased adjoining land and plans for an $80,000 addition; W. G. Wilkins Co., architect.

PHILADELPHIA.—The American Road Machinery Co. plans to enlarge its works at Kennett Square.

PHILADELPHIA.—The Crosson Electric & Machine Co. has been incorporated; $20,000; by L. A. Brownhill, Wilmington.

PHILADELPHIA.—The Cresson Electric & Machine Co. has been incorporated to act as electric machinist and consulting engineer; $20,000; by A. J. Shearman, Philadelphia, L. A. Brownhill, M. E. Dorsey, Wilmington, Del.

PHILADELPHIA.—John N. Gill & Co. has been awarded the contract for a steel and brick machine shop to be erected at 1015-1019 Hamilton street, for H. B. Underwood & Co.; H. E. De Hoff, architect.

PITTSBURGH.—The Cyclone Fence Co., of Waukegan, Ill., will erect its proposed factory here during the coming summer.

PITTSBURGH. — The Darlington Steel Casting Co., recently organized as previously announced, has secured the plant formerly operated by the United States Foundry & Fur-

nace Co., at Darlington, Pa., and will manufacture small high grade steel castings.

PITTSBURG.—Henry Schenk & Co. has the contract for a $100,000 fire-proof warehouse to be erected at Magnolia, Liverpool and Preble avenues, Northside, for the McKinney Mfg. Co.

PITTSBURGH. — The United Engineering & Foundry Co. has received an order from the American Sheet & Tin Plate Co. for a 300-ton forging press, to be installed in the works at Vandergrift, Pa.

TITUSVILLE, PA.—J. P. Dillon, who recently bought the plant of the Riverside Gas Engine Co., this city, plans to remodel the works, and will start operations as soon as the work is completed.

BAYONNE, N. J.—The Crucible Steel Co. has been incorporated; iron, etc.; by J. B. R. Smith, P. S. Brewer and James B. Reilly, Newark.

CAMDEN, N. J.—Sallisbury Worsted Mills, Inc., has been incorporated to manufacture worsted goods; $120,000; by Franklin Jones, Clark Collin, Gloucester; Harry A. Jones, Camden.

JERSEY CITY, N. J.—Jersey City Metal Cornice & Skylight Co. has been incorporated; cornices and skylights; $5,000; by Bernard Kleiner, Abraham Blum, Sarah Blum, Jersey City.

NEWARK, N. J. — Eiker Carburetor Co. has been incorporated to manufacture carburetors; $100,000; by T. B. Eiker, Newark; H. Eiker, Allenhurst; C. W. Burroughs, B. B. Smith, Ashbury Park.

NEWARK, N. J.—Decker Mfg. Co. has been incorporated to manufacture engines and machines; $25,000; by E. E. Decker, Saybrook; F. C. Decker, Sr., Elizabeth; W. S. Price, New York city.

PHILLIPSBURG, N. J. — Phillipsburg Light, Heat & Power Co. is being organized; $45,000; W. H. Walters, attorney.

DOVER, DEL.—The Azo Motor Co. has been incorporated to deal in motor vehicles; $750,000; by L. E. Latta, New York; W. J. Maloney, H. E. Latter, Wilmington, Del.

BALTIMORE.—The Diez-Romer Brass Co. has plans ready for its proposed factory on the new Fallsway.

BALTIMORE.—The C. D. Kennedy Co. has let the contract for enlarging its factory on South Eutaw street to Edward Brady & Son.

WASHINGTON. — Upton-Smoot Construction Co. has been awarded the contract for a $20,000 ice plant to be erected at 2503 D street northwest for Chris. Heurich.

WASHINGTON, D. C.—Bids will be received until 11 a.m., March 28, at the navy department for four steel towers in the Canal Zone; separate bids on the foundation are acceptable.

CENTRAL STATES

CANTON, O. — The Automobile Products Co. has been organized to manufacture various automobile parts and other metal products; $150,000; by Daniel Thomas, S. Ake; C. A. Fisher, attorney; E. J. Welty is interested.

CINCINNATI. — The Cincinnati Rubber Mfg. Co. considers extensive additions to its plant.

CINCINNATI.—The Automobile Equipment Co., $100,000 corporation, will need equipment for its machine repair shop and garage, 215-217 East Fifth street; E. H. Maffay is interested.

CINCINNATI. — The Purified Petroleum Products Co. of Southern Ohio will erect a $30,000 oil refining plant here with a 50,000-gallon per day capacity; J. F. Turk, general manager.

CINCINNATI.—The Ideal Steel Wheel Co. is contemplating moving its business to either Elkhart, Ind., or Toledo, O. The change is to be made to get nearer the center of the automobile industry. Negotiations are under way for locations in these cities, but nothing has been definitely settled.

CINCINNATI. — A small amount of equipment will be needed by the Automobile Equipment Co., which will operate a general machine repair shop and garage at 215-217 E. Fifth street, that city. The company has a capitalization of $100,000. E. H. Maffay of Cincinnati is actively interested in this concern.

CINCINNATI.—Considerable laundry equipment will be needed by the Home Steam Avondale Laundry Co. for its new plant, which will be constructed on the east side of Reading road, near Florence avenue. Henry N. Hooper, architect, Cincinnati, has been commissioned to secure estimates with the object of beginning building operations within the near future. The building will be 60 x 143 feet, three stories, reinforced concrete. The estimated cost is $35,000.

CLEVELAND.—The J. A. Palm Mfg. Co. has been incorporated; iron and steel products; $10,000; by J. A. Palm, E. V. Loeber, J. G. Craig, F. Duerr, A. S. Butler.

CLEVELAND.—The City Machine Co. has been incorporated; $30,000; by John Neiding, M. B. Campbell, Quay Findley, William Patterson, L. A. Pejane.

CLEVELAND.—Noble Air Pump Co. has been incorporated to manufacture air pumps; $25,000; by E. G. Derr, G. B. Longman, T. S. Dunlap, J. C. Noble, C. H. Truscott.

CLEVELAND.—The Cleveland Stone Co. suffered $10,000 loss when its No. 2 mill at Amherst was destroyed by fire. New electrical machinery had just been installed.

CLEVELAND.—The Cleveland Coil and Mfg. Co. has been incorporated; motor and dynamo coils; $10,000; by H. L. Carleton, Owen N. Wilcox, Chas. A. Norris, Geo. W. Bach, Geo. A. Shivley.

CLEVELAND.—The Cleveland-Pennsylvania Interurban railway has been incorporated to build and operate an electirc railway between here and Pittsburg; $50,000; by Harry P. Smith, Elijah E. Ashley, G. A. Bowers, Robt. P. Herbert, A. Wadsworth.

DAYTON, O.—The Rieck Sheet Metal Co. has taken a 10-year lease on a 1-story plant.

DAYTON, O.—The Weideke Machine Co. has bought land adjoining its plant on 1839 Richard street and will erect an addition; Otto Weideke, superintendent.

GREENVILLE, O.—The Greenville Electric Light & Power Co. has increased its capital stock from $115,000 to $155,000.

DAYTON, O.—Bids will be received until 10 a. m., March 11, for 52-foot bridge over Wolk creek; address W. H. Aszling.

DAYTON, O.—The Dayton Power & Light Co. asks permission to issue $604,500 worth of cumulative preferred stock for immediate and prospective improvements and flood damage repairs.

JEFFERSON, O.—Bids will be received until March 17 by the county commissioners for a plate girder bridge over Cowles creek at Water street, Geneva township.

MARIETTA, O.—Marietta Valve Cup Co. has been incorporated to manufacture valve cups; $5,000; by F. W. Baines, R. F. Brown, Carl Core, A. A. Haddox, R. Mervyn.

MARIETTA, O.—W. B. Alexander, county auditor, will open bids March 5 for South Twin bridge across Little Licking river; plans are on file at his office; certified check for 5 per cent of bid is required.

McARTHUR, O.—The McArthur Bridge Co. will build a power house separate from the present machinery building, and add two boilers and a 300-horsepower engine and generator.

MENTOR, O.—The Hanna Transit Co. has been incorporated; $175,000; by W. W. White, T. H. Garry, Robert McCreary, N. B. Snavely, Luther Day.

MIDDLETOWN, O.—County emergency commission has received plans for the proposed $135,000 bridge between this city and West Middletown; a $170,000 viaduct is also specified.

MT. VERNON, O.—Bids will be received until Feb. 28 for material for extending the water system; address C. N. Williams.

SPRINGFIELD, O. — The Bowlus-Hackett Co. will need refrigerating and ice making machinery for its proposed 4-story cold-storage plant to be erected soon.

TIFFIN, O.—The Hawkins Cyclecar Co. has been incorporated to manufacture cyclecars; $50,000; by P. E. Hawkins, George Little, T. H. Zell, H. L. Sayre, D. W. Cosley.

TOLEDO, O.—The Dow Safety Co. has been incorporated; switch safety devices; $25,000; by W. A. Dow, J. T. Pierce, N. M. Turner, Wm. G. Clark, Ralph S. Cram.

MARTINS FERRY, W. VA.—The Whitaker Glessner Co., Wheeling, will erect a 125 x 250-foot addition here; Alexander Glass, president.

WHEELING, W. VA.—The J. E. Moss Iron Works will spend $15,000 on improvements to its plant.

WHEELING, W. VA. — The Wheeling Electric Co. leased its present location for 10 years, also 28-foot frontage; J. D. Garden, superintendent, plans extensive improvements.

ELIZABETHTOWN, KY. — The Hardin county court has appointed a committee to investigate the advisability of building a bridge across Rolling Fork river.

JACKSON, KY.—The Consolidated Coal Co., which has a large power station here, will erect 150 miles of high tension transmission lines to furnish current to all cities and mining centers within a 60-mile radius of Jenkins.

LOUISVILLE, KY.—The Walnut Hotel Co. has been incorporated; $400,000; by E. I. Smith, J. A. C. Lattimore, W. H. Wright, W. T. Merchant, S. O. Johnson, H. S. Bonner, John Hudgins, W. E. Whitehead.

ANDERSON, IND. — A company may organize to start a paper products plant; W. H. Fairchilds, Chicago; Berg Heindricks, Anderson, et al, are interested.

BROOKVILLE, IND.—Bids will be received until 11 a.m., March 17 by the board of commissioners, Franklin county, for the following bridges: Cedar Grove bridge over Whitewater river, a two 80-foot steel span superstructure; estimated cost, $23,000; Orphans Home bridge over same river, two 212-foot steel spans; estimated cost, $19,000; Chas. Reifel, auditor of Franklin county.

COLUMBUS, IND.—The Columbus Handle & Tool Co. has increased its common stock from $25,000 to $100,000 and elected M. Flesh, Piqua, O., president, and C. M. Handley, treasurer.

CONNERSVILLE, IND. — Steel Hub & Forge Co. has been incorporated to manufacture and sell steel hubs, etc.; $40,000; by W. B. Ansted, Connersville; E. W. Ansted, F. D. Bates.

ELKHART, IND.—The city is considering various propositions on the lighting question and hopes to award contract by Aug. 1; A. P. Maltby, Chicago, consulting engineer.

FORT WAYNE, IND.—The Indiana Engineering & Construction Co. has been incorporated; $10,000; by Harry C. Offut, Harry P. Morgan and Emmet Martin.

FRANKFORT, IND.—Larick-Stough Co. has been incorporated; pipe threading machines; $10,000; by Samuel H. Stough, Harry C. Larick, Frank E. Colter, et al.

INDIANAPOLIS.—The Clark Crank Co. has been incorporated to manufacture machinery; $75,000; by William R. Clark, Glenn R. Funk, T. H. Mueller.

INDIANAPOLIS. — The Muellerschoen Home Electric Light Co. has been incorporated; individual electric lighting plants; $50,000; by Charles Muellerschoen, John M. Alhgren, Hardy V. Royal.

INDIANAPOLIS.—Automatic Gas Motor Co. has been incorporated; autos and accessories; $200,000; by F. B. Whitlock, Hervey Bates, Jr., H. F. Campbell, C. W. Hackleman, E. E. Stafford, H. H. Fulton.

LAPORTE, IND.—The Walker Starter Co. has been incorporated; starting devices; $30,000; by Frank H. Walker, W. H. Luffbourrow, Dwight L. Luffbourrow, Edmund L. Walker, Dora Walker.

MUNCIE, IND.—Interstate Motor Co. has been incorporated; autos and motor vehicles; $300,000; by F. C. Ball, Ed. B. Ball, J. M. Maring, B. W. Twyman, T. F. Rose, George A. Ball, F. D. Rose.

TERRE HAUTE, IND.—Better Roads Mfg. Co. has been incorporated to manufacture road machinery; $350,000; by Chester V. Joseph, Albert Strouse, H. W. Sutton.

BENTON, ILL.—The Sanitary Stove Co. has been incorporated; $175,000; by Charles A. Aiken Jr., Moses Pulverman, David Schlesinger.

CHICAGO.—J. J. Kocher & Co., 806 West Seventy-ninth street, are preparing plans for a nurses' home 60 x 70 feet, brick and iron, to cost $25,000.

CHICAGO. — John Refakes, 242 North Clark street, is forming a syndicate to put up a 14-story steel frame hotel at West Madison and South Canal streets, 80 x 100 feet, construction to start May 1.

CHICAGO. — Central Plumbing & Heating Supply Co. has been incorporated to manufacture and deal in boilers, steam and hot water supplies and specialties; $25,000; by R. G. Smith, Thomas Murphy and Felix Gogolinski, 1858 West Huron street.

CHICAGO.—Interstate Car Co. has been incorporated to manufacture and deal in railway supplies and equipment; $100,000; by Chester S. Holzman, Maywood; C. E. Fitch; David E. Bleloch, 223 East Sixtieth street, Chicago.

CHICAGO, ILL.—The Simplex Ice Machine Co. has taken out articles of incorporation in West Virginia with a capital stock of $250,000. The company manufactures refrigerating systems. Among the incorporators are C. C. Schmidt, S. N. Pond and Albert H. Graves, all of Chicago.

EAST ST. LOUIS.—Murphy Construction Co., Murphy building, has a contract for a four story reinforced concrete office building, 59 x 142 feet for the East St. Louis & Suburban Electric Railway Co.

HAWTHORNE, ILL. — Plans are being drawn by R. P. Manard for the Western Electric Co., Hawthorne, Ill., for a seven-story office and manufacturing building, of reinforced concrete and steel.

OAK PARK, ILL.—Plans have been completed by E. E. Roberts, 82 West Washing-

ton street, Chicago, for an addition to a public school, steel frame, three stories, to cost $75,000.

GRAND RAPIDS. — Wernetter-Bradfield-Mead & Co., 441 Houseman building, are taking bids for a power house, 50 x 50 feet, for the Sterling Desk Co., of brick, structural steel, with metal sash and frames.

GRAND RAPIDS, MICH.—M. Brandy & Sons, have plans for a store and loft building, five stories, 60 x 100 feet, of stone and structural steel, with metal skylights and steel ceiling.

GRAND RAPIDS, MICH.—This city will vote on the establishment, construction, municipal ownership and operation of a hydro-electric development plant on Grand river; also extension of flood protection work within the city limits.

BELOIT, WIS.—C. Mattison & Sons Co., manufacturer of wood-working machinery, will soon enlarge its shops on Fifth street.

MADISON, WIS.—The Wisconsin capitol commission has awarded the general contract for the construction of the north wing of the new Wisconsin capitol building to T. C. McCarthy, of Madison, who constructed the remainder of the building, which will cost $7,000,000 when finished. The north wing contract price is $78,474.

MILWAUKEE.—John Hays Smith Co. has been incorporated; engineering work; $25,000; by John Hays Smith, Frank C. Glas, Edgar M. Storeng.

MILWAUKEE.—Plans for a new 180-foot, 2-span railroad drawbridge for the Chicago & North-Western R. R. Co. at the foot of Jefferson street, were approved at a hearing held by the war department, subject to final approval by the department head. Construction work will begin about March 15. W. H. Finley is chief engineer.

STURGEON BAY, WIS. — The Sturgeon Bay & Liberty Grove Interurban Railway Co. has completed surveys of the proposed electric railway system in Door county, to cost $200,000 and be 15 miles long. It is intended to complete preliminary work so that contracts for construction and equipment may be let before the end of summer. E. W. Olberg, Sturgeon bay, is chief engineer.

TWO RIVERS, WIS.—The Hamilton Mfg. Co. desires to correct an erroneous impression in the trade that it is making an addition to its steel furniture plant. The addition is being made to the wood-working factory, which produces printers' furniture and wood type.

TWO RIVERS, WIS. — The Two Rivers plant of the Aluminum Goods Co., Newark, N. J., is to be increased in size, which will make it probably the largest individual plant of its kind in the world. A 3-story fireproof building, for buffing, finishing and storage, will be erected at once. A 500-horsepower turbine engine is being installed in the power house and the drive changed to electric motors throughout, save in the rolling mill. The present 250-horsepower engine is being transferred to the rolling mill, which has just been completed, and the old rolling mill made part of the power plant proper. The output will thereby be doubled and the working force increased from 300 to 375.

JOPLIN, MO.—C. S. Bankard Machinery Co. has been incorporated; $5,000; by C. S. Bankard, A. W. Thurman, M. I. Bankard.

KANSAS CITY, MO.—Job Hollinger Construction Co., 615 New Nelson building, has general contract for a hospital and training school, of reinforced concrete, three stories, to cost $250,000.

ST. LOUIS.—Fire destroyed the two buildings of the corroding department of the Hammar Bros. White Lead Works; loss about $75,000.

ST. LOUIS.—Irwin Automatic Signal Co. has been incorporated to own, operate, manufacture and deal in signal devices and safety appliances; $50,000; by Joseph J. Dillon, Wm. G. Berg, S. A. Van Nort, Charles F., Ellen F. and L. H. Smith, E. C. H. Fallkes, T. J. Craden, W. A. Koeneman, E. A. Koeneman, F. R. Newby.

CHELSEA, IA. — Joseph Benesh, town clerk, will receive bids March 2 for a municipal water works to include 151½ tons cast iron pipe, Class B, 7,149 pounds special castings, 40,000-gallon tank and tower, 200-gallons per minute triplex pumps, 15-horsepower oil engine. Also for laying mains, setting valves and hydrants, installing pumps and engines, digging two 40-foot, 8-inch wells and erecting a pumping station building near the wells.

ESTHERVILLE, IA.—Bids will be received until noon, March 5, for three reinforced concrete arch bridges; Chas. A. Root, county auditor.

LITTLE FALLS, MINN. — The county auditor at Little Falls, Minn., will take bids March 1 on two steel bridges with reinforced concrete abutments and floors; a steel bridge with 40 foot span and 16-foot roadway of reinforced concrete; a steel bridge 30 foot span with concrete floor, bids March 10; steel bridge 90 foot span, concrete floor and abutments and 18-foot roadway.

MELROSE, MINN.—Bids will be received until July 17, 8 p. m., for a 100-foot steel bridge on concrete abutments; S. S. Chute, St. Cloud, Minn., engineer.

MINNEAPOLIS.—The Brown Iron Works has increased its capital stock $300,000 in order to enlarge later.

SOUTHERN STATES

BIRMINGHAM, ALA.—The Nuway Packing Guard Co. has been organized; $50,000; N. J. Rogers, president; J. T. Newby, vice president; L. J. Snow, secretary; it will manufacture and sell an improved journal packing guard for railroad cars.

BATESVILLE, MISS.—Bids will be received until March 3, 8 p. m., for water works; Dabney Engineering Co., Memphis, Tenn., engineer; J. B. Crothers, clerk.

GULFPORT, MISS.—Bids will be received until 10 a. m., March 3, by the mayor for one motor-driven, constant-duty pump, 750-gallon capacity against 30-pound head with 6 in. discharge; also 60-cycle, 3-phase 220-volt motor; H. D. Shaw, city engineer.

McCOMB CITY, MISS.—Bids will be received until March 3 for 2,000 linear feet of 4-in. water mains and fire hydrants; address J. D. Harrell, city clerk.

FREEPORT, TEX.—Representatives of the Houston & Brazos Valley railroad and Brazoria county have agreed on the type and location of the proposed railroad and highway bridge over the Brazos river connecting this town with Velasco.

GALVESTON, TEX.—The Water Investigating Committee reports that the water supply should be increased. The plant will probably be enlarged, another boiler installed and another well sunk.

HOUSTON HEIGHTS, TEX.—S. J. Dill has been granted franchises for water, light and gas; preliminary work on the plant to cost about $1,000,000 has begun.

MARSHALL, TEX.—E. B. Hayes Machinery Co. has been incorporated; $40,000; by E. B. Hayes, R. L. Fortson, J. B. Schrott.

SAN ANTONIO, TEX.—The San Angelo Foundry & Machine Co. will enlarge its capacity.

HARRISBURG, ARK.—Percy W. Winters has taken charge of the light plant here and may add a machine shop to the plant.

STUTTGART, ARK. — The Arkansas Machine & Boiler Works has purchased the Lane & Bowler machine shops for $2,700 and will move the machinery to its present location at once.

CHATTANOOGA, TENN. — The county court has voted $100,000 bonds for improving Walnut street bridge across Tennessee river.

OKLAHOMA CITY, OKLA.—Jarbo Metal Co. of Atoka has been incorporated; $10,000; by Mrs. Flora Jarbo, Mrs. Ada Jarbo and Thomas S. Gill, Gilpin, Okla.

WESTERN STATES

LEOLA, S. D.—Bids will be received until 3 p. m., April 7, by J. B. Wittmayer for 12 to 72-in. galvanized corrugated steel culverts for 1914.

LAWRENCE, KAS.—The Metal Car Seal Co. has changed its name to the Edgar Steel Seal & Mfg. Co.; George B. Edgar, secretary.

DEER LODGE, MONT.—Contract for the construction of two steel bridges for Powell county has been awarded to O. E. Peppard of Missoula.

GREAT FALLS, MONT. — Bids will be received until April 15 by the United States Reclamation Service for the placing of 485,000 pounds of steel reinforcement bars and the erection of 105,000 pounds of miscellaneous metal work.

MILES CITY, MONT.—The city council has adopted plans for a suspension bridge to span Tongue river. Bridge provides for a 2-inch galvanized steel wire cable 275-foot span and 75 feet to anchors of concrete on each shore.

DENVER.—This city voted Feb. 17 to build its own rather than buy the Denver Union Water Co.'s plant valued at $14,000,000.

AMSTERDAM, IDAHO.—The Consolidated Milling Co., Twin Falls, will start construction on a steel elevator here in May.

PAYETTE, IDAHO.—Pence & Went have decided to install an electrical pumping plant for irrigation purposes in the spring.

WALLACE, IDAHO.—A 300-ton concentrator is to be built on Nine Mile by the Custer Consolidated Mining Co., operating mines on Custer mountain.

BELLINGHAM, WASH.—Mayor J. P. De Mattos recommends a $400,000 bond issue for a municipal lighting plant.

BLAINE, WASH. — The Blaine-Lynden Electric Co. has been incorporated to build an electric line between here and Lynden; John J. Pinkney, president.

KALMA, WASH.—The Washington-Oregon Corporation will build a $50,000 hydro-electric plant to replace the one destroyed by fire Jan. 20.

OLYMPIA, WASH.—The Richland Northern railway has been incorporated to build a line from Richland, in Benton county, north to connect with the Milwaukee road; $1,000,000.

SEATTLE, WASH.—Seattle Chain Co. has been incorporated; chains and machines; $5,000; by H. E. Wooley and A. H. Hoffman.

SEATTLE, WASH.—C. J. Erickson, Downs building, this city, who has contract for railroad building on the Olympic peninsula for the Chicago, Milwaukee and Puget Sound Railway Co., will build 5½ miles of logging road to reach a body of fir timber near Brinnon, Washington.

SPOKANE, WASH. — E. W. Houghton, architect, Collins building, Seattle, is completing plans for a $100,000, 4-story, concrete and steel theatre building here for August Paulsen.

LOYALTON, CAL.—R. B. Young has applied for a franchise to erect electric transmission lines along the roads in Plumas county; bids for the above franchise will be received until March 12, by H. P. McBeth, county clerk.

TRADE NOTES

AKRON, O.—The Northern Ohio Traction & Light Co. has increased its capital stock from $13,000,000 to $15,000,000.

BAYONNE, N. J.—The Bergen Point Iron Works has placed contracts for electrical apparatus for mill equipment including 110 to 125-horsepower mill type motors with control equipments, 36 smaller motors from 25 to 100-horsepower, 120 two motor coal car equipments, 16 transformers from 50 to 425-kilovolt-amperes, switchboard and accessories to be installed by the General Electric Co., Schenectady, N. Y.

BRIDGEPORT, O.—The Bridgeport Fdy. & Machine Co. has filed a preliminary certificate of dissolution; signed by R. D. Whipple, Ralph H. Whipple and Chas. N. Cheate, a majority of directors.

CINCINNATI.—The Ohio Knife Co. will move into its new factory at Dreman avenue and the C., H. & D. railroad the latter part of March. The company will have over three times the capacity of its present factory and will also have all its equipment of the latest modern type. This new building consists of two wings, one of which is 38 x 365 feet and the other 38 x 240 feet. These wings are connected by a shipping room 32 feet square. The building has a frame-work of steel, and is fireproof throughout. H. W. Randolph is president and treasurer of the company.

CLEVELAND. — The Victor Vacuum Cleaner Co. has increased its capital stock from $1,000 to $50,000.

KENDALVILLE, IND.—The Indiana Fuel & Light Co., operating here and in Garrett, Auburn Junction and Auburn, has been bought by capitalists of Sturgis, Mich., who consider forming a $200,000 company to establish offices here.

MARION, IND.—The Hoosier Stove Co. has increased its capital stock by $50,000 preferred stock.

MILWAUKEE. — The Milwaukee-Western Fuel Co. awarded the general contract for the construction of a $60,000 warehouse and office building at the foot of Washington street, to replace the structure destroyed by fire in January, to the Frank Luenzmann Construction Co., Milwaukee.

RACINE, WIS.—The Mitchell-Lewis Motor Car Co. of Racine, has sold its entire wagon manufacturing interests to a corporation known as the Mitchell Wagon Co., of Racine, the incorporation of which has previously been noted in The Iron Trade Review. By this transaction the Mitchell-Lewis Motor Co. is enabled to pay off its entire gold note issue and an amount said to be $2,700,000 is added to its working funds. It will henceforth devote its entire attention to the production of automobiles.

ROCKFORD, ILL. — Rockford Lathe & Drill Co. has increased its capital stock from $50,000 to $100,000.

The Rolling Mill Industry

By F. H. KINDL, Engineer

A Condensed, General Description of Iron and Steel Rolling Mills and Their Products.

Cloth, Illustrated - - - $2.00
Full Flexible Leather - - $3.00

In this work the author has endeavored to give a condensed, general description of iron and steel rolling mills and their products, without discussing the details of rolling any special material. Essentially, it is a summary of American rolling mill practice, its development being traced from the beginning to the present day.

An effort has been made to define more closely the various mills and their products and the various classifications herein presented have been approved by leading manufacturers and many of the country's foremost iron and steel engineers.

The charts which graphically show the production of semi-finished and finished products, from 2,000 pounds of iron ore, 1,000 pounds of coke and 600 pounds of limestone represent modern practice at some of the largest open-hearth plants and rolling mills. Charts also are included to clearly illustrate the amounts of material charged and produced in making one ton of pig iron; the distribution and production of iron and steel in 1907 and 1911; the conversion of pig iron into the various finished products, etc.

For those interested in the economics of the iron industry, a table has been prepared in which a comparison has been made of the general fundamental factors dictating the production of pig iron in the United States, Germany and Great Britain, with particular reference to the Pittsburgh district of the United States, the Rheinland-Westfalia district of Germany, and the Cleveland district of Great Britain.

The Iron Trade Review
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Effect of Oxygen on the Quality of Cast Iron—II

(*Continued from page* 408)

approximately equal dimensions in all directions, instead of permitting its formation into plates of great length and breadth, but little thickness.

It is easy to detect the presence of the phosphide eutectic in irons containing 0.50 per cent or more of this element, and the structure of this eutectic, judging by its appearance, seems to be very different from that of the carbon eutectic. It is, in fact, very much more like pearlite. This also is probably an element of strength to the mass as a whole.

Chromium

Two twin remelts were made with chromium, using special cylinder iron. In one case there was added to one of the crucibles enough chromium to raise the percentage of this element to 2.18 per cent; in the other to 4.00 per cent. The results are given in Table II. It will be noted that the strength is but slightly increased over that of the same iron untreated, while the combined carbon is materially increased, as shown by the chill and by the fracture of the bars. The chill, of course, was increased also, but not to the extent we had expected with these percentages.

We secured for examination a pig of an iron now being recommended for its chill and strengthening qualities on account of its chromium content, and were struck at first glance by the presence of a white spot in the center of the pig. We accordingly made a photograph of the iron from an edge of the pig. The conclusion seems irresistible that while chromium throws carbon into the combined condition and, therefore, increases the strength within certain limits, it also causes the formation of a eutectic similar to, if not identical with, that which forms in high-carbon irons. Reasoning by analogy, as well as by results from the test bars, with their relatively insignificant increase in strength for a very considerable increase in combined carbon, we seem justified in believing that, while chill and some strength may be secured by the addition of chromium, it will never be possible to obtain simultaneously by this means all the qualities for which the better grades of charcoal iron are in demand. These qualities we now attribute to their high content of oxygen; the high temperature and strong deoxidizing conditions necessary for the reduction of chromium are, to say the least, unfavorable to the simultaneous presence of this element and of oxygen.

Manganese

By a fortunate chance we have had to make for commercial reasons two or three runs on an iron of much higher manganese than common; in one case going up to standard spiegel. On each occasion when the manganese has risen somewhat beyond 1 per cent we have been able to perceive at once in the chill blocks and test bars made from the cast an increase in chill and an increase in strength, but the chill is of the high-cleavage variety and is accompanied by high carbon, as is well understood in the case of spiegel. An examination of the shining plates of spiegeleisen will show the high-cleavage structure to which I have so often alluded; in fact, on the broken ends of some pigs of this material plates scarcely thicker than a sheet of writing paper and almost as large as one's thumb nail may be seen sticking out from the body of the iron. These we take to be the eutectic of iron, manga-

nese and carbon, exactly similar to those already described for high carbon and for chromiferous irons.

It seems likely that this characteristic structure may account for the poor wear given in service by chilled objects made with ordinary irons and ferro-manganese or ferro-chrome additions.

Car Wheels

In car wheels it is well understood that the strength and chill prescribed by the Master Car Builders can be obtained by this means, but it is also a matter of sorrowful knowledge to the railroads that these wheels will not give the wear in service obtainable from wheels made of good charcoal iron, and that shelling out is their great weakness. Their structure is fundamentally one composed of these flat plates massed together, but not interlaced, because they seldom penetrate one another. It is natural that under the combined stresses of temperature due to braking and the rolling stress due to moving contact with the rail, separation should occur along these cleavage planes at points some little distance removed from one another, and that these cleavages should eventually come to form the boundaries of a section of tread, which, becoming more and more loosened, finally becomes detached altogether, causing a shell-out.

The same thing applies to the surface of chilled rolls, but not to the same extent, because the intensity of stress per unit of area is less severe.

Conclusions

1.—Irons which contain oxygen to a considerable extent, in a form as yet unknown, are stronger and tougher and have better chilling qualities than irons containing less of this element, but of the same analysis in other respects.

2.—Irons may contain a sufficient quantity of carbon to make them rotten and worthless through the predominance of the eutectic structure when deficient in oxygen, and yet, when they contain a considerable quantity of oxygen, be entirely free from this structure and of excellent quality.

3.—Furnace conditions control whether the carbon shall be below or above the eutectic ratio and the presence of much or little oxygen, the two dominant factors in the fundamental quality of the iron; that iron, broadly, being the best which is made at the lowest temperature.

4.—Charcoal irons can be made at temperatures several hundred degrees lower than are practicable with coke and have a great possible advantage in that respect. This is largely wasted without good furnace work in the broadest sense.

5.—Phosphorus up to 0.50 per cent or more exercises a beneficial influence on the strength of the iron and the depth and character of the chill. Phosphorus also has a tendency to reduce total carbon.

6.—Aluminum and titanium tend to reduce the strength and chilling power of the iron by removing its oxygen, but titanium may have an influence independent of this on account of its removing nitrogen also.

7.—Chromium and manganese have an almost identical effect in raising the total carbon and throwing it into the combined condition. The latter increases the chill and the strength, but the combined carbon so produced is in the form of eutectic plates, which deprive the iron of much of the strength which it would have with the same combined carbon in the absence of these plates.

8.—Chill produced by these elements cannot be expected to have the same wearing qualities as that produced by elements which do not further the formation of flat plates of eutectic.

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